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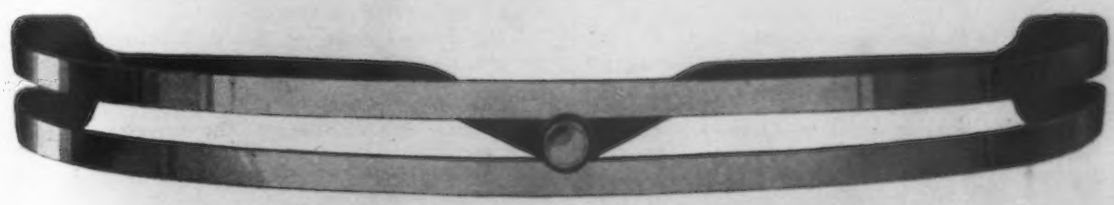


Bumpers Put on Production Basis

Mass Output Made Possible by Simplifying Design of Product, and by Equipping and Laying Out Plant for Rapid Progression of Work

BY F. L. PRENTISS

THE large output of automobile bumpers, with which nearly all motor cars are now equipped, has enabled bumper makers to improve their manufacturing methods and to put their shop work on a mass production basis. Changes in both production methods and design recently made by the Eaton Axle & Spring Co., Cleveland, have resulted in a marked increase in plant efficiency. The bumper department has been laid out so that the work is conveniently routed through the various successive operations, and new equipment, designed especially for the manufacturing operations, has been installed.

Important factors that enter into the design and construction of an automobile bumper include strength, resiliency, simplicity, appearance and the wearing qualities of the finish. The Eaton company has redesigned its bumper to simplify its construction and to permit the elimination of nearly all bolts in assembling, rivets being substituted. The changes have resulted in reducing operations, in increasing output and in cutting down manufacturing costs. The new design is known as a plate-end type of bumper. It has two or three front bars or rails that are rounded at the ends, a back bar, which forms a truss, and triangular plate sections to which the front and back bars are joined by riveting in assembling the bumper. The bolting of the back bar to the front bar at the center, the same bolt holding an emblem in place at the center, completes the assembly.

Before bringing out this bumper the company had been making the bolt-end type. In this type the front and back bars are bolted together, requiring the forming of an eye at the ends of the bars and the bolting of the parts together. This type requires three hot operations. In forming the plate-end bumper only one heating and drawing operation is required. The bumper is so designed that it is assembled on punch presses, which are used for the riveting operations. The plate and back bars are riveted together two at a time, and later this member is assembled to the front bars by riveting. It is stated that the bumper can be assembled two and one-half times as fast as the bolt-end type.

Output Increased 40 Per Cent With No Additional Floor Space

One of the most interesting features in the production line is a special cambering and quenching machine designed by the company for the combined operation of forming and quenching the rails and back bars. A hardening furnace serves in the double capacity of heat treating the steel and heating it for the forming operation. With the new lineup of forming, heat treating and assembling equipment, together with continuous japanning and baking equipment and overhead monorail conveyors, which are provided where practical for handling parts in process of manufacture, considerable floor space formerly used for dead storage has been converted to more active uses, resulting in a net gain of 40 per cent in the output with the same floor space as heretofore used.

The steel used in the manufacture of bumpers is standard S.A.E. high carbon spring steel. Fittings used for attaching the bumpers to the cars are mostly made of the same material, die-forged to shape, although some of the fittings are malleable iron castings. The bumper design is well standardized, but special fittings must be provided for each type of car, and bumperets, which have rather generally replaced rear bumpers, are specially designed for each type of car.

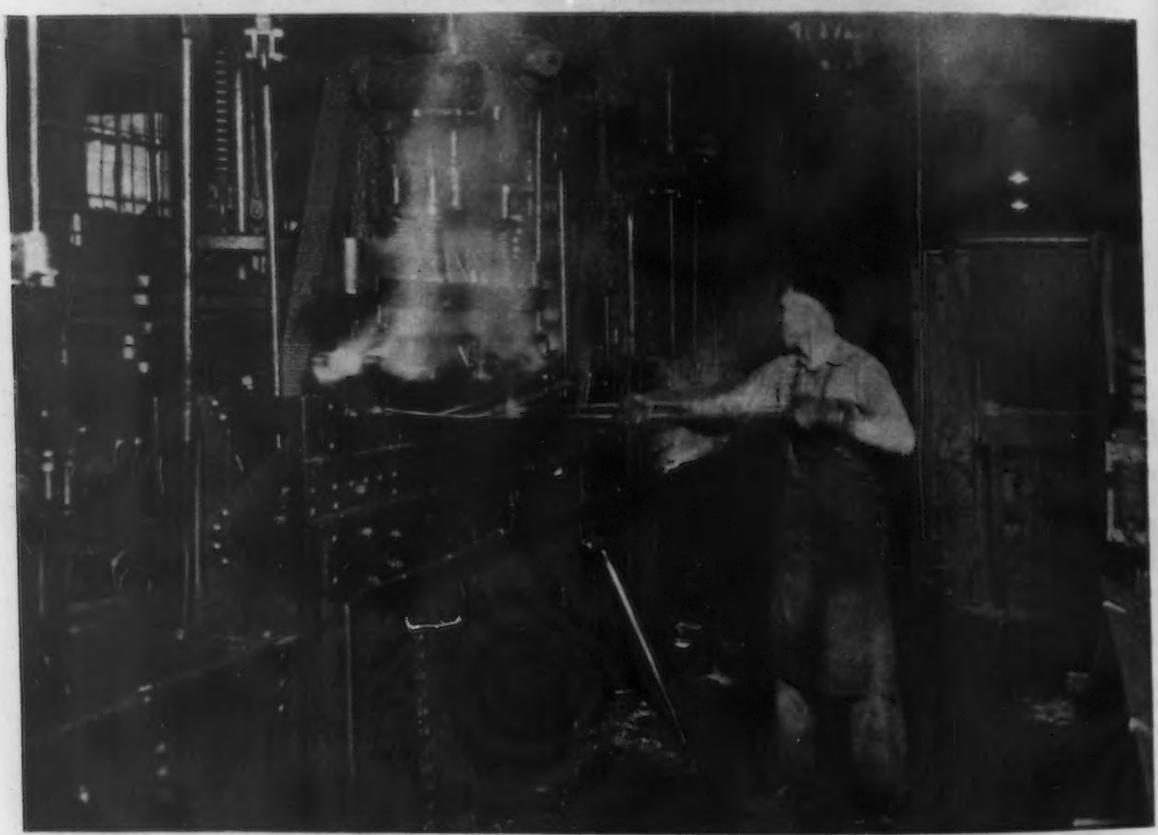
The stock used for the bumper rails or bars and for their supporting member, known as the back bar, consist of flat steel bars in standard sizes, 1½ in. to 2 in. wide and ¼ in. to 5/16 in. thick. Bumper rails that have a plain nickel surface are made from a plain flat bar. However, to provide a variety in bumper design the Eaton company is now making a grooved type

rail that has a combination finish of black and nickel lines. This type has single or double grooves in the rails, which are japanned, and the remaining surface is nickel plated. With a single groove there is a single black line in the center, and the nickel plating on each side breaks the monotony of a full nickel-plated flat surface. With two grooves there are two narrow lines of black and three ribs of nickel plating.

The manufacture of the grooved type of bumper necessitated the rolling of special grooved shapes for the rails, and several bar bills have provided rolls for this purpose. The steel for both the plain nickel and grooved-type bumpers is shipped from the mills in 5-ton bundles, mostly in 22-ft. lengths, being cut to multiple lengths in order to avoid scrap loss. To each bundle is attached a tag giving the heat number, size of stock, length and weight. Specifications require that the stock be within 1/64-in. limits for width and within 0.005 in. plus or minus in thickness.

By a downward movement of the plunger actuating the machine the rail is bent in the form of its finished shape, with an arched front and the ends bent round in a graceful curve. Concurrent with the forming operation, the forming mechanism moves downward and the formed bar is plunged into a bath of quenching oil. In order to prevent warping it remains under the pressure of the forming mechanism while cooling. The bar stays in the quench 3 min. The forming and quenching mechanism is driven by a bronze worm and gear. The drive from the motor is through a chain belt to a geared shaft, which drives the worm gear. The drive is operated by a three-way switch and is controlled by an electric brake.

The formed rails, on being withdrawn from the quench, go to a continuous drawing furnace having a moving chain-type conveyor, in which they are brought to a temperature of 900 deg. Fahr. This furnace is 21 ft. long, and the speed of the conveyor is timed to



Bumper Bars Are Heat Treated and Heated for Forming in One Furnace Operation. The bars, after being brought to a temperature of 1575 *deg. Fahr. in the continuous furnace at the right, are placed in the combined cambering and quenching machine shown in the foreground. In this they are formed to their final shape, and the forming mechanism carries them down into an oil quenching tank. Then they go to a tempering furnace*

The first operation in the manufacture of bumpers is cutting the stock to length in the steel warehouse. From the shears the bars are loaded on lift platform trucks and conveyed to the bumper factory. The next operation on the plate-end bumper rail is punching holes for riveting the rails to the plate section. Several presses are located in a row in front of the heat treating furnace, and on these all cold operations are done.

Bars Formed and Quenched in a Single Operation

After punching, the rails are placed in the continuous heat treating furnace, and the work is carried through the furnace on a table of the walking-beam type. The furnace is 18 ft. long and is gas fired from 12 burners. It has a capacity of 600 2-in. wide bars per hr. These are brought up to a temperature of 1575 deg. Fahr. When a heated bar reaches the end of the conveyor at the discharge end of the furnace, a furnace attendant picks it up with a pair of tongs and places it in a cambering machine located nearby. Two bars are placed side by side in the machine on a form that is adjustable for different sizes and forms of rails.

take care of the work as it comes from the heat treating furnace and the forming and quenching machine. The furnace has 17 burners, all controlled by a McKee mixer. Three conveyor-type furnaces are provided for heating and three for drawing the bumper rails. Both the hardening and drawing furnaces are connected with thermocouples and pyrometers.

Conveyors Carry Parts Through Japanning Vat and Baking Oven

From the drawing furnace the rails go to a battery of eight cylindrical, 36 x 72-in. Sly tumbling barrels, in which they are tumbled for 1 hr. to take off the scale. The fittings and back bars are tumbled in the same mills. The back bars and parts for fittings are japanned and baked. After tumbling, the parts to be japanned are mechanically cleaned in a soda solution in a Crescent washing machine to provide a clean surface for japanning. On leaving the washing machine they are hung on hooks from a conveyor, which carries them down an incline to a vat of japan, through which they move very slowly to assure a good coating. The conveyor carries them on through an adjoining continu-

A Special Rapid Production Machine Is Provided for Rough-Polishing Bumperet Bars. It has a capacity of 300 pieces per hr. and materially reduces hand labor

pus baking oven. As they emerge from this oven the parts are lifted from the conveyor racks on to monorail conveyors, which carry them to the stock room for fittings or directly to the assembly department. It is 1 hr. 35 min. from the time that a piece is hung on the racks for japanning until it is removed from the racks at the discharge end of the baking oven. The japanning and baking oven was built by the Young Brothers Co., Detroit.

Some of the parts, such as clamps, bolts, washers and other accessories for fittings, go directly from the baking oven to the parts storage room, where they are placed in sets in bags bearing the same numbers that are given the fittings with which they are to be used. Later the fittings and bumper and bag of parts are placed together in a pasteboard container, making a complete unit ready for shipment.

Rails Polished, Cleaned and Scrubbed for Plating

The bumper and bumperet rails, after tumbling, go to the inspection department. Then they are polished on a series of emery wheels constructed of graded emery to give them a smooth surface on the face for the plating. After polishing, they are cleaned electrically and then scrubbed with pumice. They are then ready for the face or strike coating of nickel plating. Following this they are copper plated and buffed, and then are given a final nickel plating and are again buffed. The successive plating and buffing operations provide a lasting high-luster finish. The finishing operations on the grooved type of bumper rail differ somewhat from those of the plain type, as in this type the grooves are japanned after nickel plating. Japan is applied over the whole face of the bumper rail with a hand brush and is then wiped from the nickel-plated surface by means of a pad, leaving the grooves covered with the coating of japan. Then the rails go to an oven for baking the japan. This is a conveyor-type oven built by the Gehnrich Indirect Heat Oven Co., Long Island City, N. Y.

Rapid production in rough-polishing bars for one type of bumperet is accomplished by the use of a spe-

Back Bars and Various Fittings Are Cleaned in a Washing Machine at the Right and Hung on Racks on a Conveyor of a Japanning and Baking Oven at the Left. After emerging from the baking oven, a monorail conveyor carries them to the assembling department or the stock room

cial polishing machine, which is resulting in considerable saving in hand labor. The bars are mounted in pairs on a cylinder holding 10 pieces, which are locked to the cylinder by a quickly operated cam and lever mechanism. As the cylinder rotates, the operator removes the polished rails two at a time and replaces them with two others. The machine is provided with a pair of emery grinding wheels, 18 in. in diameter by 3½-in. face. A rail is rough-polished by one pass against the wheel, after which it is given the final polishing on standard polishing machines. The special machine, which was built by the Excelsior Tool & Machine Co., St. Louis, has a capacity for rough-polishing 300 pieces per hr. The grade of emery wheels can be changed for operations other than rough polishing.

Rivets used for fastening the rails to the back bar

Manufacturing Costs Have Been Reduced by So Designing the Bumper that its Parts Can Be Riveted together on a Punch Press. Rivets take the place of bolts, and their use has speeded up the assembling operations. This picture shows the front bumper bars being riveted to the back bar assembly

assembly are coated to prevent corrosion. Uncoated rivets are used to fasten the back bar to the plate sections, as these are protected by a japan coating, which is applied after the plate and back bar are riveted together.

Glue for Resurfacing Emery Wheels Carefully Controlled

An interesting feature of the plant is the glue room, which is in charge of a specially trained attendant, who sees that the glue is kept at a proper mixture and temperature at all times and that the emery troughs are filled with emery of proper grain for resurfacing polishing wheels. Two drying rooms are provided, one for drying the wheels used during the day and the other for those used at night. The wheels for the day force and night force are kept separate. For the economical operation of the polishing department it is important that sufficient wheels be provided to allow ample time for the glue to set before the wheels are used, and the polishers glue their wheels before they quit work, so that they will be ready for use the next day.

A complete inspection is provided for the different parts in the various manufacturing operations. Rails after tumbling and before nickel-plating are checked with a fixture for uniformity in form, and any irregularities are corrected. Checking fixtures are provided for other members to assure uniformity of duplicate parts. After the rails are buffed, they are inspected by men trained to discover minor defects in plating that might later cause trouble, so that as far as possible only perfectly plated bars are allowed to go through to the assembly department. There are also inspectors to see that the right fittings and other parts are placed in the shipping cartons.

Make Numerous Tests to Insure Quality of Product

In order to maintain its product at a high and even quality, a physical and chemical laboratory is provided for testing and analyzing the steel used. Every heat that comes from the mill is analyzed. Deflection tests are made on an Olson universal testing machine to determine the elastic limit and to assure strength and resiliency. Brittleness is determined by tests on a cold-bend testing machine. Hardness tests are made on a Brinell machine. There is also a Brinell machine in the shop for testing rails in the regular course of production and also those fittings that are heat treated. A microscope is provided for testing specimens in case trouble should be experienced with the steel. The nickel plating solution is controlled from the chemical laboratory, being checked daily to make sure that it is of the proper constituency, and several rails of each day's production are given a salt spray test. A check is also kept on the buffing of the nickel-plated work to ascertain if the rails are being buffed at any points to a depth that exposes the steel beneath the plating. In addition to the salt spray test, the bumpers are also put to a weather test on a rack on the roof to ascertain how they will stand up under actual weather conditions.

Investigation Reveals Principles of Boiler-Scale Formation

A physico-chemical study of boiler-scale formation and boiler-water conditioning has been completed by chemists of the United States Bureau of Mines, Department of Commerce, in cooperation with Carnegie Institute of Technology and industrial interests. This is the first fundamental scientific study conducted, from the viewpoint of the physical chemist, of the mechanism of scale formation and corrosion under the temperature, pressure, and concentration conditions that prevail in steam boilers.

The study has yielded fundamental data on which to prescribe a rational chemical treatment of boiler water, information which has been lacking in the past. The results of the investigation should tend to promote real conservation of fuels and boiler equipment and therefore offer an opportunity of effecting considerable savings in the nation's fuel bill. Fuel losses due to the formation of boiler scale run into enormous figures. A report containing the results of this investigation has just been issued as Bulletin 24, Mining and Metallurgical Investigations, by Carnegie Institute of Technology. Copies of this bulletin may be obtained from Carnegie Institute of Technology, Pittsburgh, at a price of $2.

Inspection headquarters at Youngstown have been established by the Pittsburgh Testing Laboratory, to serve that rapidly growing district. The branch is equipped for all kinds of physical tests of engineering and construction materials. Its equipment includes a 200,000-lb. testing machine. H. L. Christman, who is in charge, has been identified with inspection and testing for more than 20 years.

April shipments of fire extinguishing equipment, as reported by the Department of Commerce, totaled 81 pumping engines and 33 other types of motor-driven apparatus. Pumping engines are running well ahead of last year, the first four months having shown 294 against 251. Other motor-driven types and hand types are somewhat below last year's totals.

Tandem Mill for Wide, Thin Plates

Lukens Steel Co. Installs 84-in. Combination of 2-High Roughing Stand and 4-High Finishing Stand That Promises Large and Flexible Output

FOR the rolling of wide thin plates as well as ordinary mill plates, the Lukens Steel Co. has installed at Coatesville, Pa., replacing its old 84-in. steam-driven reversing plate mill, a new mill of 84-in. width, of the tandem motor-driven type, with a four-high finishing stand and the necessary handling and auxiliary equipment. Construction and revisions from the open-hearth furnaces to the finishing and shipping departments were supervised, after the arrangement in general was determined on by the Lukens company, by the United Engineering & Foundry Co., Pittsburgh.

The layout shown in an accompanying plan was adopted, this layout having in view the idea that it pays to keep material moving continuously from the time the slabs are started at the heating furnaces until the plates are ready for shipment. With this arrangement, it is stated, no great amount of space is necessary for storing material in process of production.

Besides the two-high roughing stand and the four-high finishing stand, the equipment includes tables with transfers, blue annealing furnace, roller leveler, cooling conveyors, inspection bed and new types of rotary side trimming shears and end shearing equipment, to do away largely with the necessity for marking-out of plates before shearing, as is common practice in plate mills.

New Types of Screwdown and Roll Changing Rig

The two-high roughing mill is the conventional type with bronze roll neck bearings. It is, however, equipped with a new patented United differential screwdown and control, which makes it possible for the operator to change easily the relation of the two screws to each other from the pulpit. In other words, the operator can at all times keep the two edges of the plate of the same thickness. A new roll changing rig was also provided, this reducing the roll changing time materially.

The new four-high finishing stand is similar in principle to the Lukens 206-in. four-high reversing plate mill, which was built by the United Engineering & Foundry Co. and installed in 1917. The design, however, incorporates developments designed to make for quick roll changes and easier and more accurate control, to reduce the power required for rolling and to make it possible to roll more accurate and thinner gages.

In the new four-high stand, the rolling is done between the two middle rolls of chilled iron, these rolls being supported by the top and bottom 40-in. diameter backing-up rolls, the necks of which carry the rolling load. Both mills are driven by General Electric reversing motors, which are coupled to the mill pinions through flexible couplings furnished by the Bartlett-Hayward Co., Baltimore. These couplings, it is stated, are the largest of their type ever built, although some small blooming mills are so equipped.

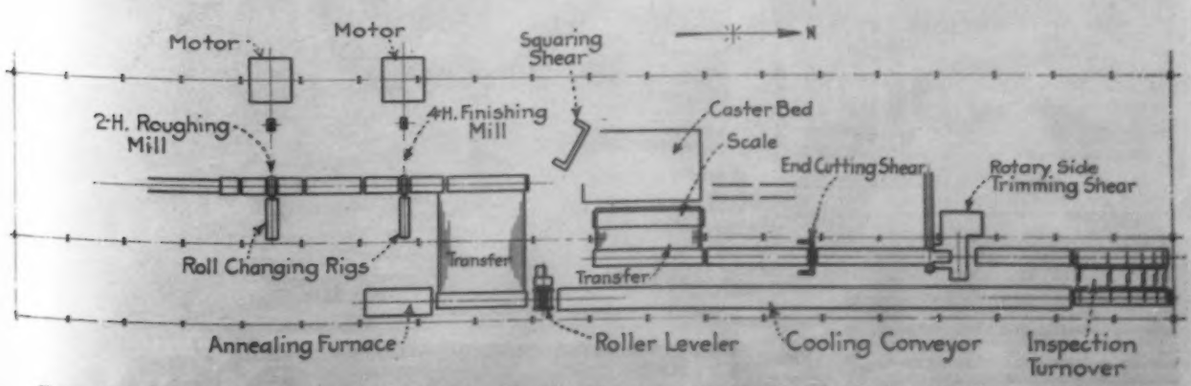
The backing-up roll necks are equipped with roller bearings instead of bronze bearings, as used on the Lukens 206-in. mill, roller bearings being a departure for plate mill roll necks. Roller bearings, it is believed by the mill designers, promise to have far-reaching advantages in that they are expected to reduce greatly the power required for rolling and to eliminate the heat caused by the neck friction where bronze bearings are used. The elimination of the heat caused by the neck friction is found to be of marked advantage in controlling the shape of the rolls and, thus, the accuracy of the rolling. Several smaller four-high mills are now in successful operation, with the roll necks equipped with roller bearings, but so far as is known, this is the largest mill equipped with this type of bearings.

Quick Roll Changes Can Be Made

The new type of roll changing rig will make the job of changing rolls much easier and safer, it is expected, as well as reducing the time for the operation. The screwdown is of the differential type, a duplicate of the screwdown on the roughing mill. The screwdown indicator is of the double dial type, the inner dial being graduated by inches and the outer dial in 0.010 in. Hydraulic balances are provided for the two top rolls and the mill end of the vibrating spindle. The pinion housing is of the entirely inclosed type and is bolted directly to the foundations. The pinions have double helical teeth. A Geer patented universal spindle is used for driving the top working roll.

The new type of rotary side trimming shear was developed by the United Engineering & Foundry Co. to give a true square edge to rotary side trimmed plates. In addition to trimming the sides of the plates, it cuts the side trimmings into short charging box lengths. A feature of the end shearing equipment, located beyond the rotary shear, is that it is provided with a gage so that when rectangular plates are to be produced no laying out may be necessary. The scrap from both shears will be delivered to a conveyor which carries it to the charging boxes outside of the building.

In the installation of the heating furnaces two problems had to be considered. One was the small amount of space available and the other the fact that at cer-



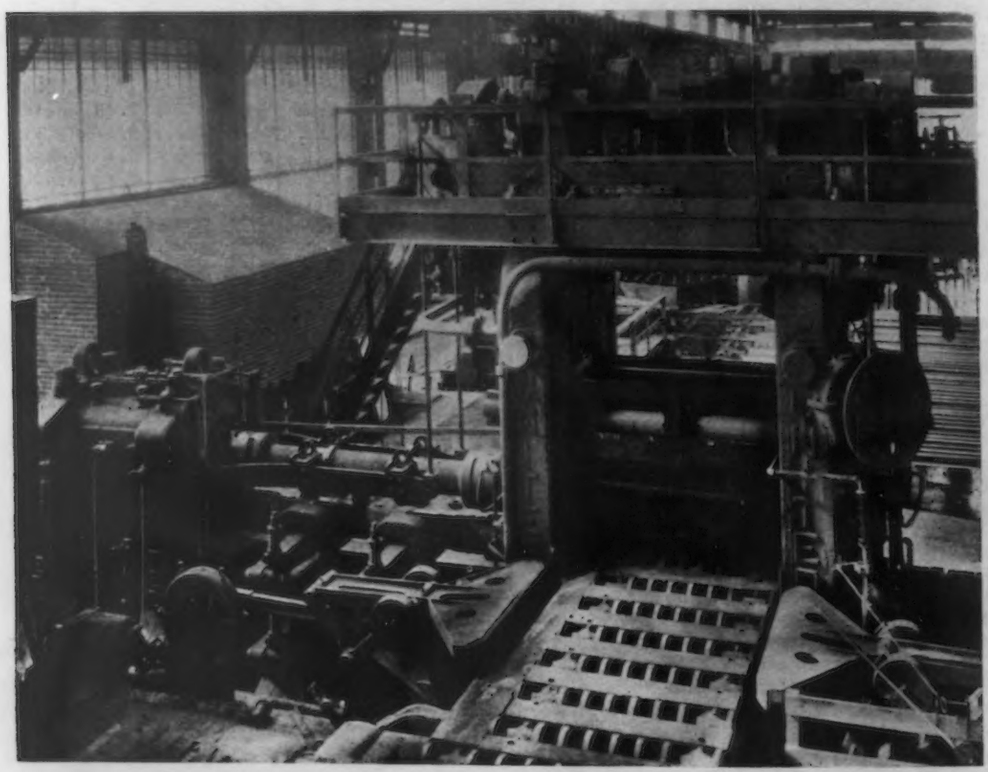
From the Time the Slabs Are Started at the Heating Furnaces Until the Plates Are Ready for Shipment, the Material May Take a Continuous Movement, Without Need of Temporary Piling or Unnecessary Handling

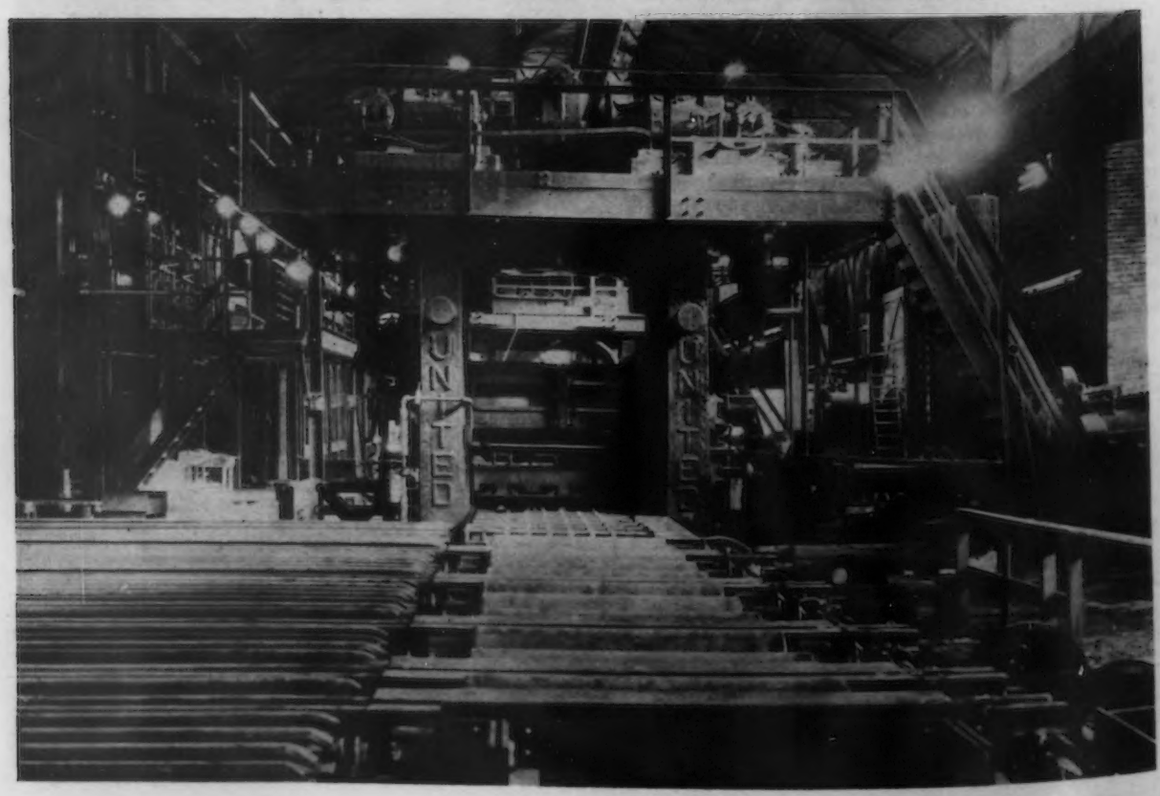
tain times a near-by creek overflows and the water comes up to the floor level of the mill building. It was decided to install two double-chamber recuperative heating furnaces designed by the George J. Hagan Co., Pittsburgh. Each chamber is designed to handle 4½ tons of steel per hour, and the effective heating size is 15 ft. long and 9 ft. wide. The furnaces are set end to end, with the recuperators placed directly behind them.

Each furnace chamber is equipped with two counterbalanced lifting type doors electrically operated from push-button control in the charging crane cab, so that the operator can completely control the raising and closing of the doors. Push-button arrangements are also located at the front of the furnace so the doors can be raised or lowered by the furnace operator.

The recuperators are of the Hagan Amco patented type, and are placed above the floor level with the waste gases introduced at the bottom and discharged to the stack from the top of the recuperator. A small fan blower delivers air to the top of the recuperator. The air travels down and through ducts to the hearth, and then flows through flues just below the floor line to the base of the furnace, where it is admitted into the furnace at the firing end. The waste gases of each furnace are pulled out opposite the firing end and are carried in ducts just below the floor over to the recuperators, where they are circulated through the recuperator, thence to the stack. The recuperators are built in units of two each, similar to the method employed on the design of the furnace.

Heat is generated in the furnace by two Hagan high pressure swivel type oil burners mounted on each end of each chamber. The burners are designed with an adjustable feature so that the flame can be directed





The Large Size of the Four-High Reversing Finishing Stand Is Indicated in These Views of the Entering and Delivering Sides

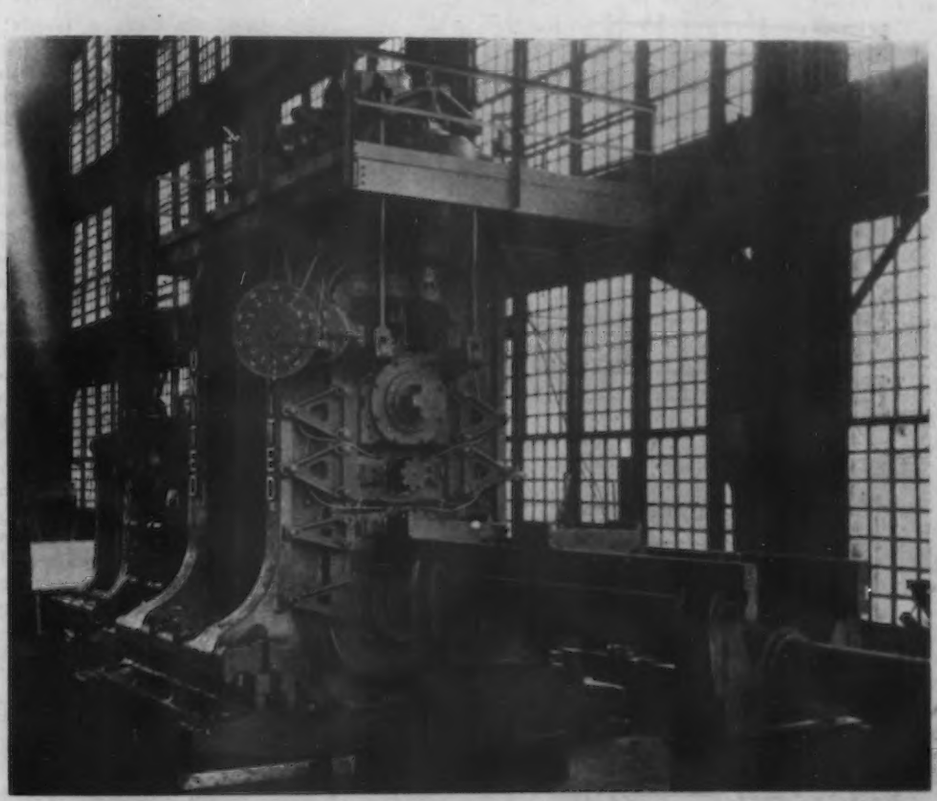
to any part of the hearth of the furnace. The burners can also be swung entirely clear of the furnace and the burner openings closed by means of a special door arrangement provided with the burner setting. Provisions are made so that the operator can control the flame or direct it to any portion of the heating chamber desired.

Cooling conveyors were built by the Link-Belt Co., Philadelphia. Auxiliary electrical equipment was furnished by the Westinghouse Electric & Mfg. Co. The R. S. Newbold & Son Co., Norristown, Pa., furnished the end shearing machine, leveling machine and some of the tables. The roller leveler has 17 rolls, an unusual number for plate mill work but chosen to secure good results on the light gage plates. A Quickwork shear of the latest type is used for cutting circles.

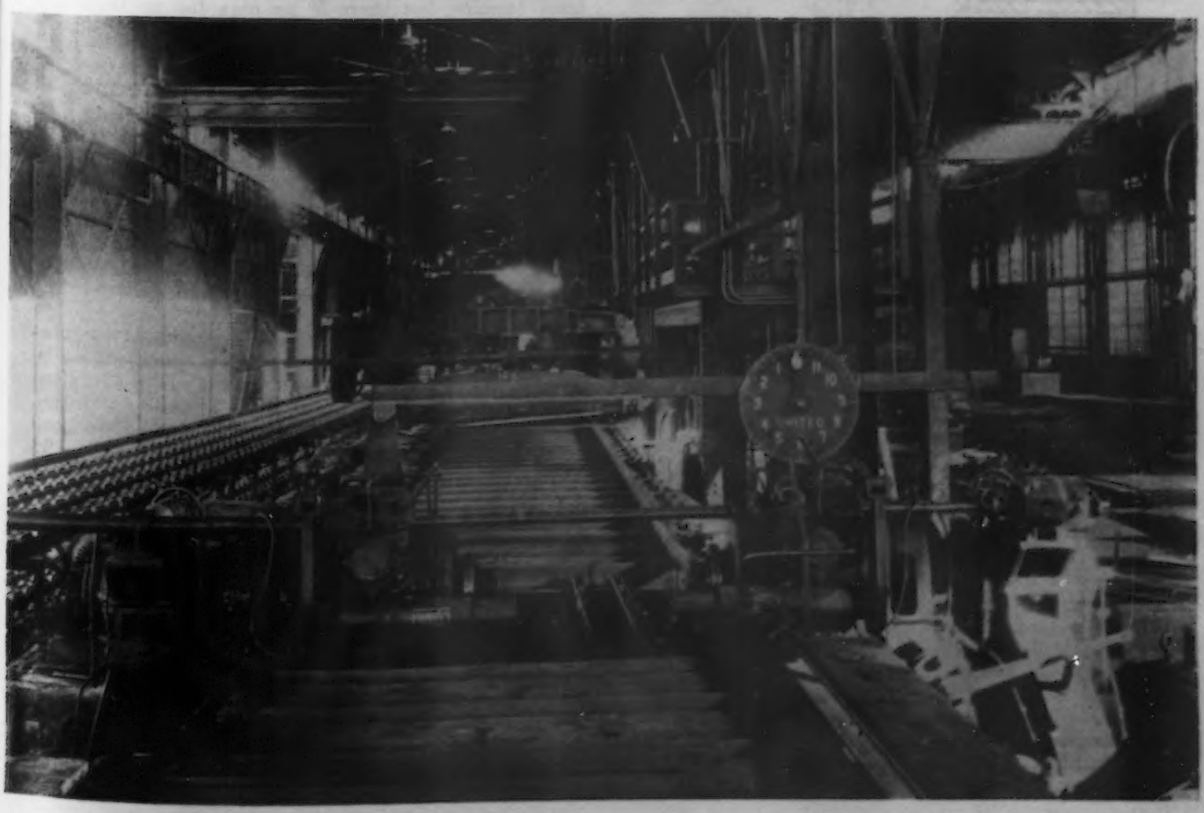
Continuous Type Annealing Furnace Has New Features

In addition to all of the above equipment, which would ordinarily be provided for the production of black plate, the company has installed a modern continuous type annealing furnace for the production of blue annealed or deep drawing stock. This furnace, which was built by the Costello Engineering Co., Pittsburgh, is 40-ft. long and 8-ft. wide inside and is designed to heat approximately 12 tons of ¼-in. plates, 60-in. wide, as delivered from the mill.

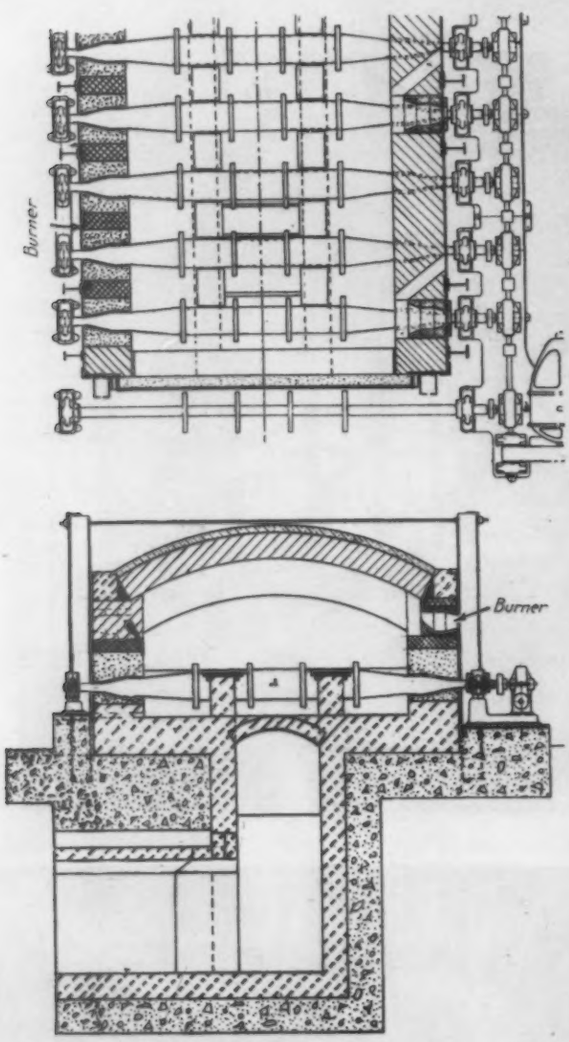
Some of the features of this furnace are of recent



Features of the Equipment Include a Roll Changing Rig, Shown at the Right, and the Rotary Side Trimming Shear, Shown Below



development, one of the most important being the use of non-cooled alloy rolls for the conveyor in the furnace. These rolls were made by the Southern Manganese Steel Co., cast of its No. 1635 Fahralloy. The rolls have approximately a 12-ft. span, the bearings being outside of the 18-in. insulated walls. Each roll carries four 16-in. disks. The rolls are placed on 24-in. centers and designed to operate at temperatures of approximately 1900 deg. Fahr., and are equipped with safety factors for this temperature condition. An advantage of the alloy rolls is said by the designers to lie in the fact that there is no heat lost from the furnace by water cooling. The disks are not cooled by the



The Annealing Furnace Employs Non-Cooled Alloy Rolls for the Conveyor in the Furnace. Each roll is driven through an individual worm gear in an oil-tight case

shafts and the temperature above and below the plate is kept practically uniform. Fuel consumption is said to be considerably reduced as compared with the units using water cooled shafts.

In the furnace drive the noteworthy points are a worm drive instead of the bevel gear or chain drive units generally used. Each shaft is driven by an individual worm gear built with its worm into an oil-tight case. These units were furnished by the Foote Brothers Gear & Machine Co. The main drive from the motor, which has been placed at the discharge end of the furnace, is connected to the worm shafts. A flexible coupling is placed between worms. The thrust of the worms is taken up in the individual cases, making each drive practically a self-contained unit. The shaft is connected to the worm gear through a flexible coupling, the shafts operating in Hyatt roller bearings. The worm gears and shaft bearings are mounted on a specially designed continuous bed plate running the length of the furnace. On the opposite side of the furnace the bearings are carried in shoes bolted and grouted.

The peculiar property of the design of the alloy conveying shafts prevents an excess amount of heat being carried into the bearings, it is stated, and the bearings are normally so cool, it is added, that the hand can be comfortably placed on the ends of the shafts, although the shaft inside the furnace wall is 1900 deg. Fahr.

The new mill, with its auxiliary equipment, will turn out plates up to 72-in. wide, ⅛-in. and thicker, with lengths up to 35 ft. Operation has been begun.

American Rolling Mill Co. Acquires Half Interest in Hamilton Furnace

The Hamilton Coke & Iron Co. has purchased the property of the Hamilton Furnace Co. at Coke Otto, Hamilton, Ohio. The new company has been organized by the Koppers Construction Co., Pittsburgh, and it will operate the blast furnace and new Koppers coke plant which is to be built at once. An agreement has been about concluded by the Koppers company and the American Rolling Mill Co., Middletown, Ohio, under which the latter company will acquire a one-half interest in the Hamilton Coke & Iron Co.

Under an agreement that is being worked out, the American Rolling Mill Co. will take the furnace company's entire output of pig iron in the form of hot metal. The distance between the blast furnace at Coke Otto and the open-hearth steel plant at Middletown is about eight miles, and the hot metal will be delivered alongside the mixer at Middletown with but little loss of heat. Under the mutual ownership agreement the American Rolling Mill Co. will secure its entire requirements of hot metal for at least the next ten years and perhaps indefinitely. For the past 15 years the company has been producing the pig iron for its Middletown plant at its two Columbus, Ohio, furnaces. The arrangements just made will save the large investment that would have been required for blast furnaces and coke works at Middletown as has been contemplated.

Hamilton furnace, which was last active in 1923, has been for a number of years in the hands of the Hamilton Furnace Co., of which John A. Savage, Duluth, Minn., is president. It is 85 x 20 ft., was built in 1907-08, and remodeled in 1918. The by-product coke plant under construction consists of 45 Koppers ovens, and a contract has been made to supply the city of Hamilton with gas. Foundations are in for a second blast furnace, but there is no plan for its immediate construction.

Manganese Ore in Gunnison County, Colorado

A telegram from Denver, Colo., published generally in the daily press, reports the discovery of a vein of manganese ore near Hall's Siding, Gunnison County, Colo., on a narrow gage line of the Denver & Rio Grande Western Railroad. It is referred to as 14 ft. wide and proved to a length of 3000 ft. and a depth of 300 ft. Tests of 50-lb. samples are said to have shown 52.86 per cent manganese.

There is reason to doubt the existence of the phenomenal quantity of ore described in the Denver dispatch. Manganese has been produced in Gunnison County in the district indicated for a number of years. The quality has been good, but the occurrences have been sporadic. It is possible that disconnected deposits have been developed more recently and that these have been taken for continuous deposits by the authors of the recent newspaper reports. For years manganiferous iron ores have been mined in Gunnison County, these running 10 to 12 per cent in manganese and 20 to 25 per cent iron, and the Colorado Fuel & Iron Co. has regularly drawn upon this supply.

"Big Boss and Lesser Ones: Executive Relations and Industrial," an address by Whiting Williams, counsel in industrial and public relations, Cleveland, will feature a dinner meeting of the metropolitan section of the Taylor Society, to be held at the Town Hall Club, New York, on the evening of May 19.

Continuous Rolling of Sheets at Butler, Pa.

How the Columbia Steel Co. Makes Stripsheets from Slabs Without Reheating

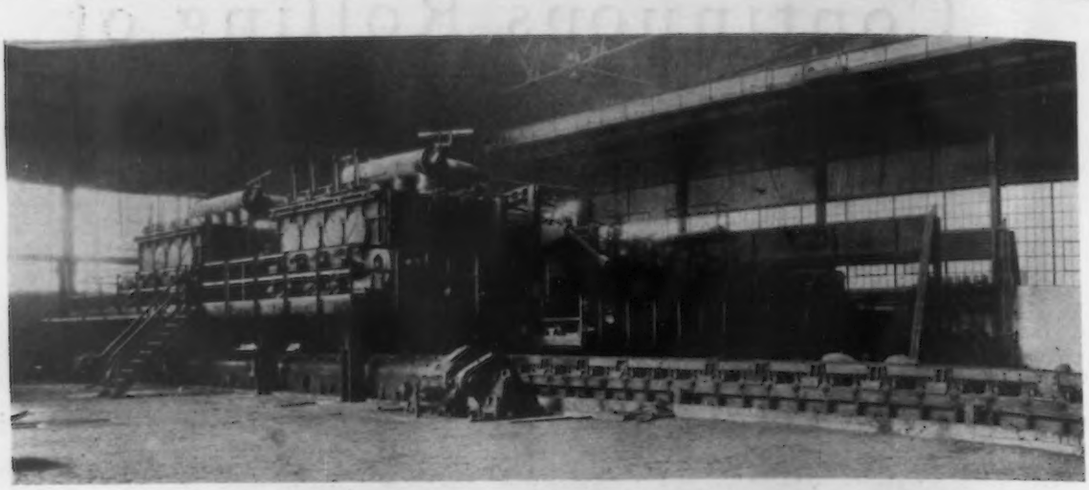
Roughing Is Followed by a Continuous Pass Through Four Finishing Stands

THE sheet mill of tomorrow is in successful operation at the plant of the Columbia Steel Co., at Butler, Pa. It is know as a stripsheet mill because it produces material of the length of strips and of the width of sheets. It is the sheet mill of tomorrow because it does in a large part mechanically what is now done by hand. Its designers and owners do not regard it as marking the complete passing of the hand sheet mill any more than did the coming of rolled steel mean the passing of wrought iron. They agree that certain light gages in common finishes will probably continue to be made on hand mills for a long time.

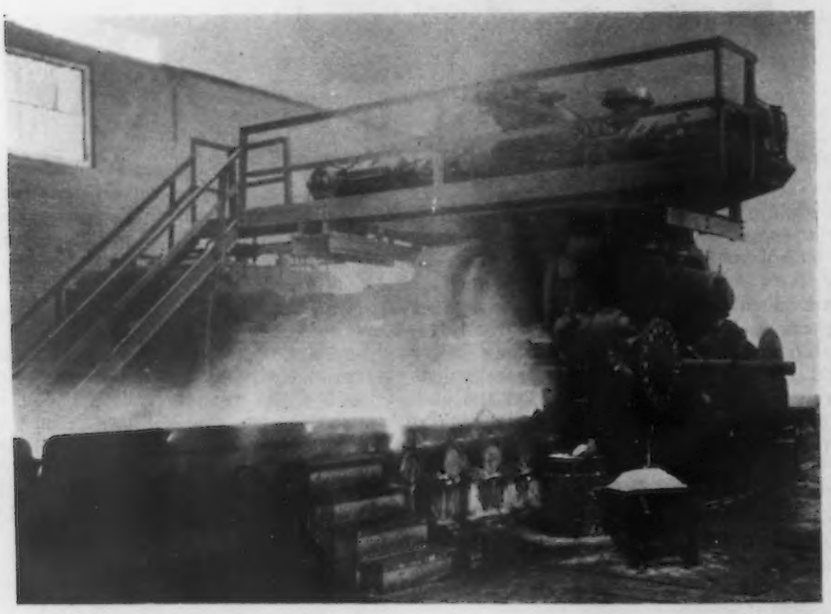
However, as a means of producing higher finished material in large production, the Columbia development spells a new era in sheet steel manufacture. Instead of the familiar sheet and pair furnaces facing a single stand of rolls, there will be found continuous heating furnaces for the heating of slabs, which are roughed on a universal mill and then led on the universal mill runout without further heating directly to a continuous four-high finishing train. The long strip of sheet steel, up to 36 in. in width, still under mechanical control and without man handling, is coiled at the end of the hot mill runout ready for annealing and pickling and continuous cold rolling, as in a strip mill, for further reduction and desired surface finishes.

The indications, on a visit to the mills, were that for a given size crew, whose jobs are essentially those of a strip mill, the production of sheets is 20 to 60

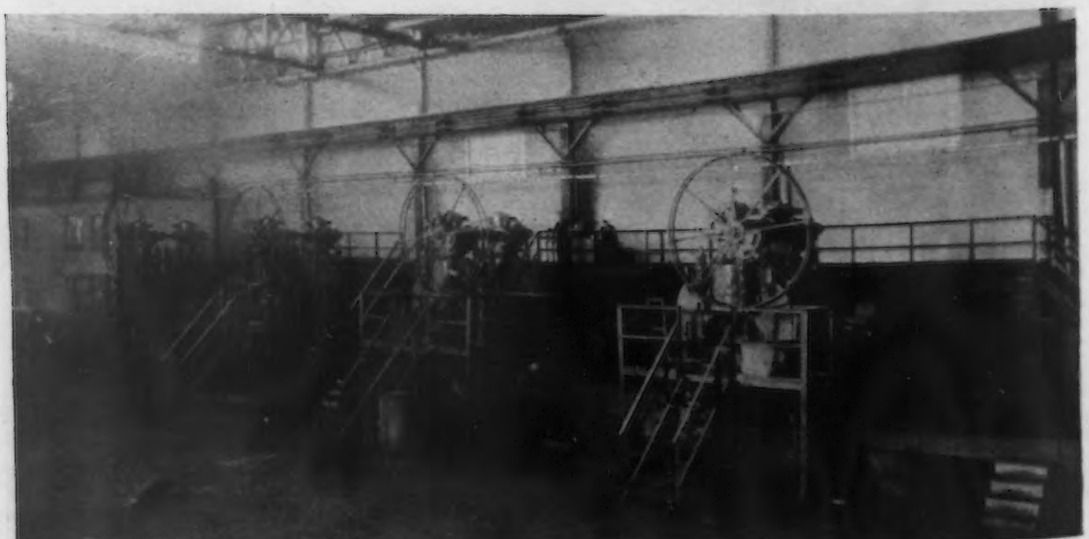
From the Slab Heating Furnaces at the Left Foreground, the Steel Passes Through the Roughing Reversing Universal Mill and Then in Succession Through the Four-Stand Train of Finishing Rolls, Reaching the Coiler at the Far End



Slabs Are Pushed Through the Heating Furnaces, Which Use Natural Gas, in Two Rows in Each Furnace and Drop upon the Roller Table



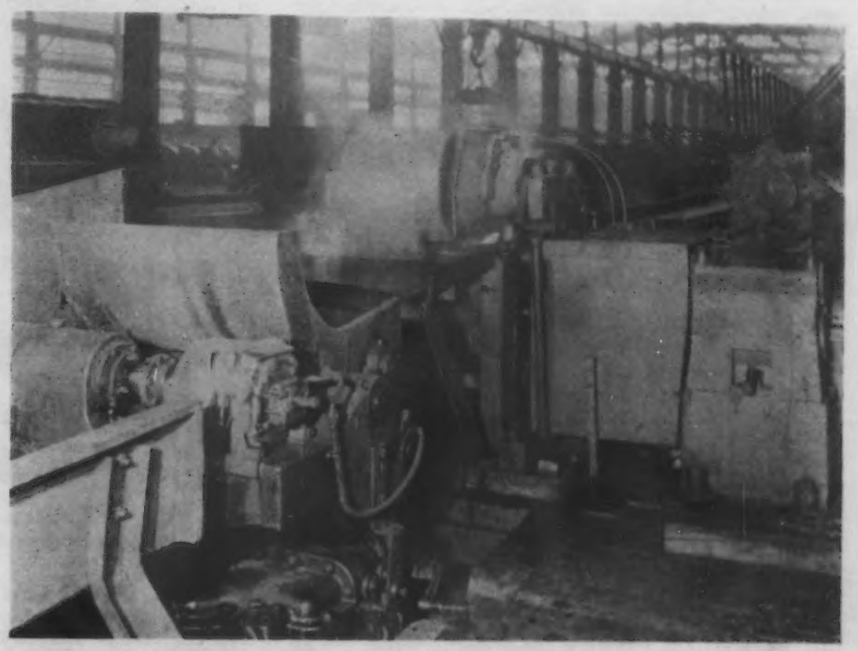
In This Reversing Universal Mill the Slab is Roughed Down Prior to Delivery without Further Heating to the Continuous Finishing Rolls



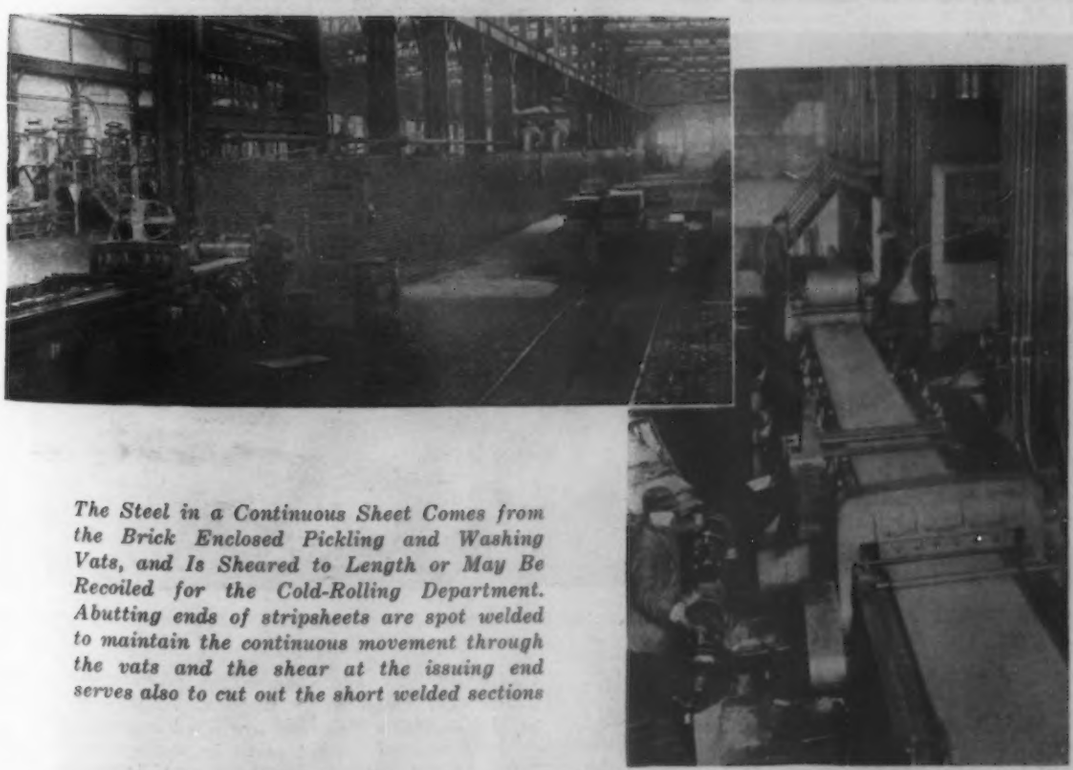
The Run Out from the Roughing Stand Comes from the Left, and from the Fourth Stand at the Right Issues the Finished Hot-Rolled Stripsheet. Against the side wall is the operating pulpit for these four four-high stands

times in tonnage what is usual in old style jobbing mills, and that, with the special means for scale removal which have been provided and the use of four-high mills, a product is obtained that is notable as regards flatness and surface. The crew of an ordinary sheet and jobbing mill numbers from 10 to 14. In the Columbia Steel Co. mill, the smaller number is sufficient to man the roughing and finishing mills. The stripsheets per month, or around 400,000 tons annually.

The roughing unit in which the slabs are broken down is similar in a great many respects to what may be described as a highly refined universal plate mill, but has unusual rigidity and is driven with a motor selected to permit rapid manipulation. The quietness of this mill is indicative of the undoubted close adjustment maintained. The mill is driven by a 5000-hp.



At the End of the Hot Mill Roller Table is the Coiler and the Rotating Hopper for Receiving, Weighing and Discharging the Coil to the Floor Aisle or to a Chute Leading to the Pickling and Annealing Aisle



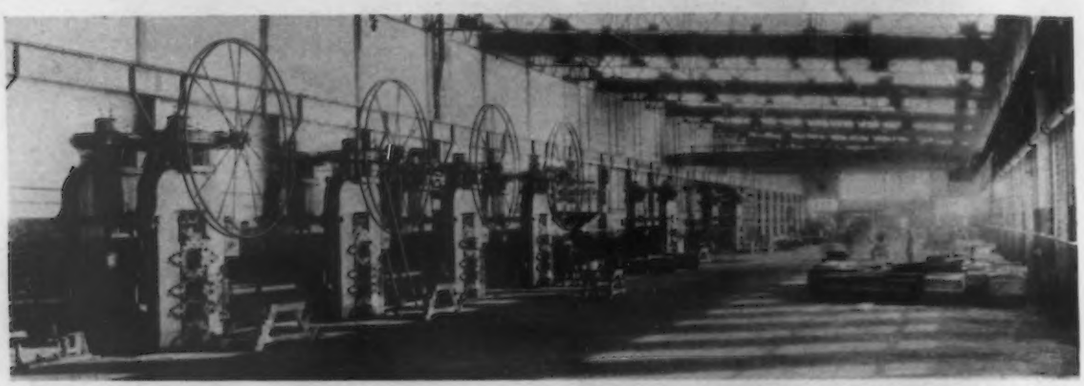
The Steel in a Continuous Sheet Comes from the Brick Enclosed Pickling and Washing Vats, and Is Sheared to Length or May Be Recoiled for the Cold-Rolling Department. Abutting ends of stripsheets are spot welded to maintain the continuous movement through the vats and the shear at the issuing end serves also to cut out the short welded sections

ordinary hand sheet mill will produce 7.65 gross tons per turn of 8 hr., and the hand jobbing mill 22.35 gross tons per 8-hr. turn, and on the premise that 16 turns per week and 50 weeks per year represent the physical limits of mill and men, the annual output of a hand mill running on the lighter gages would be 6120 gross tons, and of the hand mill rolling the heavier gages, 18,000 tons. This Butler mill is counted on to produce approximately 35,000 tons of hot rolled normal rating reversing motor, which is in turn served by a 5000-hp. flywheel set.

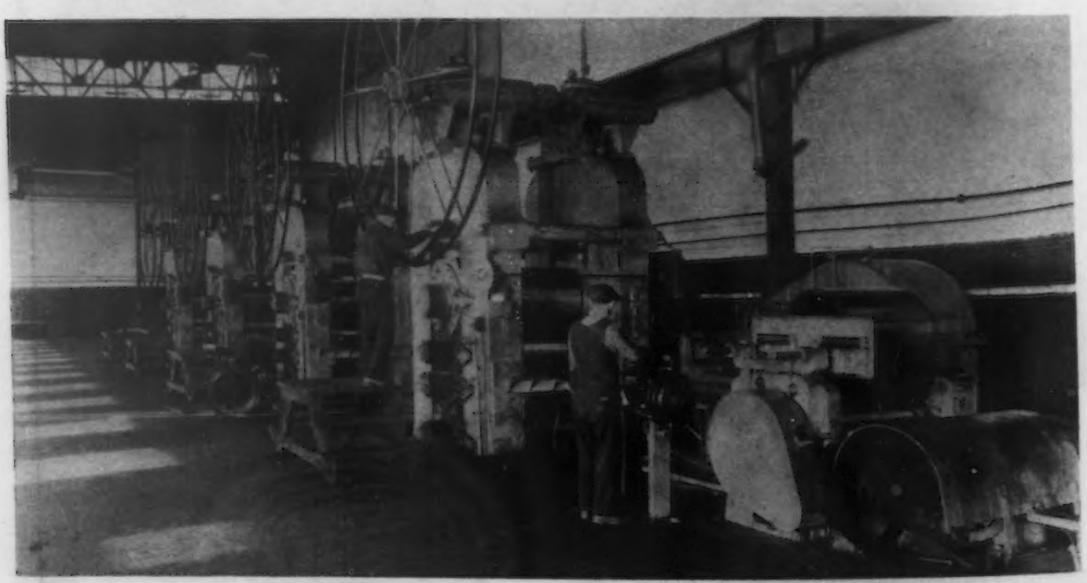
The four finishing mills of the hot mill unit are identical, and, as stated, are of the four-high type. The two working rolls, which are driven, are 16 in. in diameter, and are reinforced as in the regular four-high mill, with 32 in. diameter rolls which hold the working rolls against the pressure, one being over the upper working roll and the other under the lower

working roll. On account of the rigidity of this combination of rolls, it is found unnecessary to compensate for roll springing, as in the case of hand mills, with the result, it is emphasized, that closer gage tolerances can be observed. The success of these mills lies partly in the use of roller bearings and an individual adjustable-speed motor for each stand. Each of these direct current motors is of 2000-hp. rating, but they are capable of supplying up to 5000 hp. when the steel is in the rolls. Current for the finishing mill motors is provided by three 4000-hp. motor-generator sets, which in addition provide power for other requirements.

The four stands are controlled from a pulpit in a balcony on the side wall of the mill aisle, and the operator's duty is to vary the different motor speeds



The Cold-Rolling Department Includes a Continuous Train of Four Stands of Four-High Rolls. The view of these four shows the coiler receiving the cold-rolled product. A special contracting spider provides for releasing the coil, so that it can go to the continuous annealing furnaces. The view of all six of the stands in the department shows at the far end the inspection department



in relation to the amount of slack between the stands. The stands are roughly 20 ft. apart, and there is a pneumatically balanced loop take-up which functions to keep the metal taut between the stands, but as the arc through which this take-up operates is short, the major adjustments must be made by varying the speeds of the driving motors.

On the day of the visit to the mill No. 14 gage material, about 34 in. wide and in lengths of around 300 ft. was being rolled, and a sheet of this size delivering at high speed from a mill is truly an impressive sight.

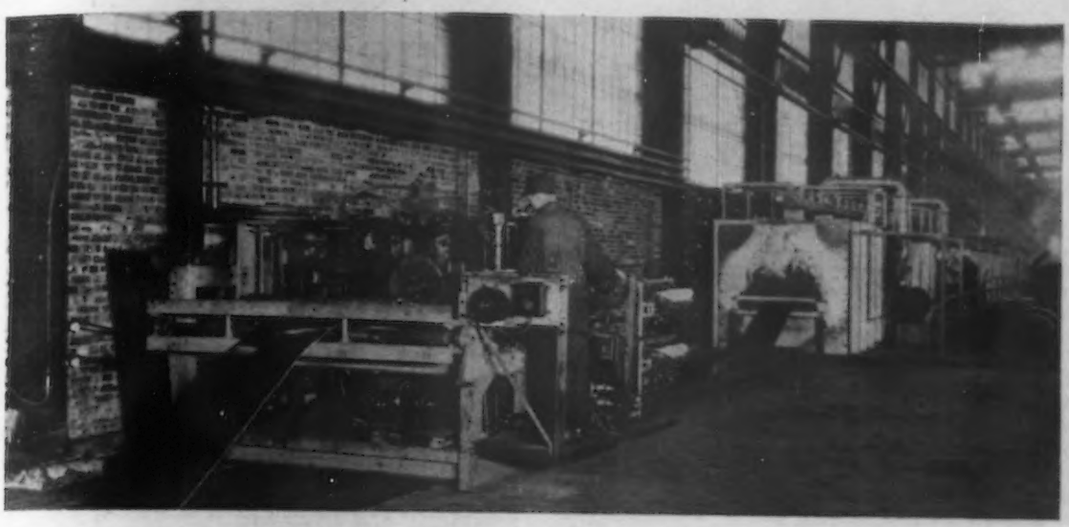
An interesting feature to the mill are the facilities provided for the coiling of the sheet and delivering it into position for loading, if shipment is to be made in the coiled form, or delivering it at the pickler if further treatment is necessary. Coiling is done in a special machine which delivers the formed coil into a hopper. This is mounted on an automatic recording scale, and may revolve so that the coil can be delivered into a short chute in the hot mill aisle, or into a long chute which carries it underground to the middle or pickling and annealing aisle.

In the middle aisle the coils are lifted from the chute with cranes equipped with magnets and delivered before a continuous pickler. Here a coil is placed in a rack from which the end is drawn by a mechanism similar to a roller leveller, and from which it is delivered to a spotwelder. The welder travels on a track and automatically attaches the ends of succeeding coils together.

The flattened sheets, still in the long lengths, move through a 250-ft. pickling vat, are pickled, then through a washing vat, and thence into an automatic shear which cuts them to commercial lengths of from 6 to 14 ft., after which they are piled automatically.

In case cold rolling is to be performed, the material is not cut but is coiled and delivered into a chute, which carries it to the third or cold rolling aisle. Here cold rolling is performed on four-high mills—material for annealing being returned to the second aisle, where this operation is carried out continuously and automatically, and the material either cut and placed in piles for shipment in the flat form, or coiled and returned to the third aisle for additional cold rolling.

The speed with which the mill was brought into production is one of the notable features. The present management took over the plant, which was formerly that of the Forged Steel Wheel Co., on Jan. 1, 1926,



How the Long Sheets Are Joined One to the Other Is Indicated in This View of the Entering End of the Annealing Furnace. The sheet is pulled from its coil, just outside the picture, by a roller-leveller type of mechanism, and the spot welding is done, while the carriage travels toward the furnace mouth, by means of the disk or wheel shown, this wheel rolling across the point of junction as the sheets lie on the carriage

but it was not until June of that year that a site had been cleared and construction activities undertaken. Yet, it was only a little more than five months later, or to be exact, on last Thanksgiving Day, that the first steel was rolled. Thus in that time new foundations had been built, new machinery erected and successful rolling begun.

This description would not be complete without mentioning the spaciousness of working areas and the loftiness and good lighting of the buildings, including the large open-hearth department and the slabbing mill, which supplies the stripsheet department with the slabs. For example, the scrap and pig iron are not stored out of doors but in a wide roofed-over area immediately adjoining the charging floor of the open-hearth furnaces, with the result that the rusting of scrap is delayed or substantially absent, and loading of charging boxes is directly done by electric magnets suspended from traveling cranes without regard to weather conditions.

The open-hearth plant, in which there are ten basic furnaces, has a capacity rated well over 500,000 tons of ingots per year. Natural gas is used as fuel, so exceedingly low sulphur contents can be secured. The slabs which are rolled in a universal mill are notable for flatness and accuracy to dimension. The corners are remarkably square, due to the action of the edging rolls in the slabbing mill, and the slabs are found to move through the stripsheet mill heating furnaces without trouble.

The Metal & Ore Corporation, Woolworth Building, New York, has been appointed exclusive agent in the United States for Chinese tungsten ore produced by Société d'Importation de Minerals, Paris, France, and Canton, Changsha and Hankow, China.

In the Inspection Department the Finished Sheets, Sheared to Length, are Illuminated by Mercury Vapor Lights Hung Immediately Above the Traveling Belts

Training of Owners' Sons

What the Boy Should Learn and Why—How His Contact with the Men May Be Established —Pitfalls to Avoid

BY WILLIAM A. VIALL

IT is a natural and laudable ambition for a father to desire to have a son enter into and carry on the business with which he has been identified, if it has been a successful one. As a matter of fact, many fathers have labored and planned such a thing for the son. With the best of will, however, does the father know just what to do? There has been no research made on this subject, and it is not possible for anyone to lay down a plan that would cover all cases. I shall not try to do the impossible by prescribing a course, but shall try to give the results of observation and some experience over a period of more than 35 years.

Preliminary Education

Probably the average boy has no marked predilection as to his life's career, but should he have, there would probably be indication of it by the time he finishes high school. If the boy has by this time developed a real inclination for art, music, trading or preaching, and shows a strong distaste for business, it is a crime to try to force him into a channel that will make him work all his life with a dislike for his occupation. When the decision is made, it must be then decided whether he will go into college or enter the business at once.

As to college or technical training, if the boy is willing to work in college for the training that college will give him, by all means have him enter and go through college, taking a course that will give him a liberal training in mathematics, economics, some science, literature, language, etc., that will make a broad man. I am considering the man who is planning to enter business as the future leader of it, and not the man who is planning to be an engineer and who may later work into the executive end.

I have purposely avoided a suggestion of college shop work or of technical training. When a college education accomplishes its purpose, it has taught a man to think for himself, to concentrate on the matter in hand, and to act intelligently.

Provided the boy is desirous of going into the business, the question as to whether it is good for the business would have to be decided. There are cases where an organization has been built up in such a way that the entrance of a member of the family, looking forward to taking control, completely destroys the work of many years. Except the prospective leader is willing to work his way in through the ranks in a straightforward way, trouble is likely to arise as time goes on.

Training in the Business

Given the case, however, that conditions all tend toward the young man going into the business, how should he be trained?

I think that the training should have two main objects: first, a knowledge of the business in its various branches; second, a knowledge of men. The chances are that the young man has been brought up in a class entirely different from those whom he has to meet in the shop and work with, but he must meet them at first hand, so that he may learn their language and their ways of thinking.

It is a question whether the father is the best instructor for his son, or whether it is for the best interests of all that the son be placed in charge of a man who knows how to train men and who is in sympathy with the task in hand. A father might be inclined to show his lack of favoritism, to be more severe and exacting with his son than would another. Or else, governed by the soft heart of a mother who feels her boy should have an easy time, he might allow him to slide over certain parts of training that the boy really needs.

The young man should be guided by one who will not allow him to be a subject of adulation on the part of employees, nor, on the other hand, to have him put upon because he is the owner's son. Excepting the young man himself has an extraordinary sense of proportion, either of these things could very easily happen.

In other words, he should be as one of the regular employees during his term of training. A course of work should be laid out that will give him an opportunity to learn the uses of tools in the various branches of the work.

Above I said I had left out the question of technical training in the case of the college student. My reason was that I think this training should be obtained under practical working conditions of the shop in which his life is to be spent. I hear some fathers explaining that boys do not like to do manual labor, that it is not the fashion among their companions. But, given an instructor of the type I have mentioned, he will be able to make the young man see the usefulness of the procedure and to create a vision that will carry him over the bumps.

Practical Work in Shop Essential

In my opinion, two years in actual shop practice would not be too long to obtain what I think the young man should have. Following this he should have a term in the drafting room, taking up work that would give him facility to read drawings readily. In connection with this he should have an opportunity to get an insight into the methods pursued in carrying through a piece of work. Also, he should have occasion to get something of an idea of the accounting system, routing system, etc., so that he will be able to comprehend problems in this direction.

After he has had a good line of work in these directions, it is an excellent plan to place him as a subforeman on some job that will require executive work to carry on. It will give him a taste of the actual shop conditions, and here he will have a chance to try out, in a small way, his possibilities as a leader.

Such a course as I am outlining will not make him a machinist or an engineer. But it will develop his talent in the directions of comprehending processes, evaluating the use of tools, and, above all, will bring him into close touch with men, giving him an angle upon his work that can be obtained in no other way. I have seen young men who have been put through some such course as this take their places in the works, and when later problems are brought to them it is extremely helpful and gratifying to find that they can discuss them from the point of view of a shop man who understands the details of what he is talking about.

Visits to Other Plants

During these years of shop experience, it would be well to have the young man make a few well planned

(*Concluded on page* 1494)

Abstract of paper read at West Point, N. Y., meeting of the National Machine Tool Builders' Association. The author is vice-president Brown & Sharpe Mfg. Co., Providence.

"Get a Profit," Says Foundry Leader

S. W. Utley, President American Foundrymen's Association, Declares Problems of Industry Can Be Solved Only by Better Merchandising Methods

THAT the solution for the present ills of the foundry industry lies in the determination of every foundryman to sell his products only at a profit was the conclusion of S. W. Utley, president American Foundrymen's Association, in an address to the Philadelphia Foundrymen's Association at the Manufacturers' Club, Philadelphia, Wednesday evening, May 11. Mr. Utley said that the experience of the last three years has proved that the foundry industry cannot operate at anywhere near 100 per cent and that 60 per cent represents fairly well the average operation of recent years; therefore the plant which tries to operate at a rate higher than the demand will sustain is doing so not only with loss to its own stockholders but without regard for the duty that a business man owes to his competitors.

Mr. Utley said the foundry industry reminded him somewhat of the negro who was working with a motion picture outfit. The director conceived the idea of taking a picture of a lion and the colored man reposing peacefully together in bed. So he called Joe and explained the situation. Joe's face turned white, and hard-up as he was for a job he could not quite face that ordeal; trembling from head to foot, he exclaimed: "No, boss; I'se not going to get in bed with no lion." "But," said the director, "you are perfectly safe, for this lion has been brought up on milk." "Yes," said Joe, "so was I, but I eats meat now."

Some of Mr. Utley's comments on the present status of the foundry industry follow:

"This industry is full-grown; with nearly 5800 foundries in the United States, with billions of dollars invested in plants, with a yearly product running into many million tons, it has long since left its infancy behind. And yet, it seems to be the opinion of a great many people that the industry is not in a prosperous condition, and I am told that other stockholders, like my own, complain that capital invested in it does not bring the returns that it does in many other lines. If you believe, as I do, that the primary object of our corporate organizations is to make money, if you agree with me that a manufacturing enterprise is not properly discharging its duty unless it does so, how can we explain this unhappy condition?

Better Merchandising a Remedy

"To a man outside a manufacturing plant the problem seems to be absurdly simple. He says, 'You ought to know what your costs are, and knowing that, you shouldn't take a job unless it nets you a sufficient margin of profit,' but, unfortunately, we all know that there are other considerations which must be met. To be profitable a plant must operate. It cannot lie idle. To operate it must have orders, for it is the customers' money and not the stockholders' money that meets the payroll and pays for material. Merely to close one's door because of lack of work does not stop losses, and as the volume of output decreases the unit cost increases, so that it is more and more difficult to keep costs below selling price.

"Each manager has about him an organization of fellow men upon whom he is absolutely dependent for the operation of his plant, and who in turn, being specialists in one line of industry, are largely dependent upon him for their means of livelihood. No manager worthy of the name will intentionally disregard the welfare of these men, nor by allowing his plant to close, save as a last resort, refuse to recognize his responsibility to them. Besides this, each plant has a certain number of customers whose castings it is bound either by contract or mutual understanding to furnish as requested. To these customers a foundry is somewhat akin to a public service corporation, although unfortunately it has never yet developed a system by which it can demand that its customers pay a part of its overhead for the privilege of having it 'stand by' ready for use when required.

Urge to Keep Plants Operating Results in Price Competition

"To close up in dull times and refuse to take customers' work, causing them to remove their patterns elsewhere; to lose an organization of able men, carefully built by years of experience, means a loss which cannot be made up save by years of the hardest kind of effort. Many times, therefore, the ablest and most intelligent management feels forced to disregard the margin between cost and selling price in an effort to get sufficient tonnage to keep the shop going, while the less intelligent management, rushing headlong through the field of customers, quoting all kinds of ridiculous prices, apparently thinks that in some miraculous manner it will be able to make a profit if it can only secure sufficient tonnage at prices netting less than cost.

"Under a great many circumstances the question of whether to refuse an order because the price is too low to make a profit or to accept it to increase work in the shop is an exceedingly difficult one, and too often is answered by sacrificing everything for the sake of additional tonnage. For it must be borne in mind that only in very rare instances in the foundry business do low prices actually increase the total amount of tonnage in the industry, and I believe that it could be shown that more castings have been bought when prices were high or were rising than in those periods when prices were low or were falling.

Business Man Owes a Duty to Competitors

"The foundryman who would satisfactorily market his product must visualize the industry as a whole. He must realize that just as modern battles are fought by whole armies rather than battalions and regiments, so modern business is conducted by whole industries instead of by individual plants. He must realize that in an industry where a man does not have a particular, definite article to sell, which differs materially from that offered by his competitors, no one has the absolute power to fix his own prices, for prices are fixed by the entire industry. The foundryman must realize that he has a duty, not only to his own stockholders but to his competitors as well, and that only by fulfilling his duty toward the latter can he do it toward the former.

"Cain's old cry, 'Am I my brother's keeper?' is daily raising itself in industry, and thoughtful business men are coming to realize that to some extent, at least, only by being the keeper of one's brother can one be sure of his own industrial salvation. I oftentimes think of the remark made by a fellow foundryman when he said, 'Just remember that by and large you can't make money yourself unless your competitor is making it too,' and the more I think of it the more I am convinced that it is sound, economic reasoning, and that it is a principle which should underlie much more of our action than it does.

"Our cheap and very efficient transportation, our rapid and dependable communication, by which we talk across the country as easily as we talk across the street, and the whole thought of our modern industry has widened our field tremendously. I suspect the domestic market of some of you gentlemen here is scarcely bounded by the Mississippi on the West and extends to the Gulf on the South, and that in many cases you compete at some time or other during the year with

practically every foundry in your own line, within these limits. The mental attitude of the manager of each one of these institutions has a definite and positive influence on your own marketing problems. You may not be able to take away a customer from a plant located 500 miles from you, but quite often you name the price at which the nearby plant has to take its own customers' business, and it or some other plant too often names the price at which you have to take your business.

"One of the great needs of most of us today is to put more emphasis, not on the duty our competitor owes us, but rather on the duty we owe our competitor, and to realize that many things besides charity begin at home. The bigger and stronger we are, and the higher the standing of our companies, the greater the disastrous effect of poorly studied and uneconomic methods of merchandising.

Prices Too Often Based on Metal Costs

"Any jobbing foundryman who would merchandise his product intelligently, suffers from the fact that our industry has grown up with a fundamental misconception, and that so far it has been impossible in a large measure to throw this off. Because one of the ingredients of our product is metal, both buyer and seller seem to think that it ought to be priced on the basis of the number of pounds of this metal it contains. All of us are prone to forget that the production of castings is more in the nature of an art than of a standardized manufacturing process, and that other elements enter into its cost far more than does the metal of which it is composed,

"A careful analysis of my own company's total manufacturing cost for a three-year period shows that the metal which went into the furnaces comprised but 18.8 per cent of our total cost and that our labor, including management, consumed 49.9 per cent. The materials other than metal, plus general manufacturing expense, accounted for 31.3 per cent of the cost. In other words, during the whole of the three-year period, metal accounted for less than one-fifth of our total cost of making castings. These figures will vary somewhat for other foundries, but nevertheless it holds true for all of us, that instead of selling pounds of metal, primarily we are selling hours of labor, miscellaneous material and general expenses, and yet, when the metal market starts to drop and we have a decrease in the cost of the basic material going into our product, our customers generally call for a reduction much in excess of the actual amount we have saved, and in the mad scramble for business on a falling market we often find prices dropping four or five times the decrease in the cost of one of the minor elements in our product.

Foundry Industry Cannot Operate at 100 Per Cent

"In common with most of the metalworking industries, the foundry industry seems to be overexpanded. Figures I have compiled for the steel casting branch would show that for the years since the close of the war miscellaneous steel foundries have operated at an average of 55.1 per cent of their capacity, and that for the last 14 years, including the war years, the figure has been but 63.8 per cent. From these figures it is evident that the steel foundry capacity is very much in excess of the present demand. Assuming that these figures fairly represent other branches of the foundry industry (I am quite sure they do the malleable iron branch), I fail to see how any foundry manager, unless he is helped by unusually favorable conditions, can expect for any considerable length of time to operate his plant at 100 per cent of capacity. I cannot see how he can argue that if he invests additional capital in an increase in his plant facilities, and thereby enlarges his capacity, he can reasonably hope to get the increased tonnage which alone will justify the expenditure and increased overhead.

"If in the light of these facts we are forced to contemplate the necessity of operating over a period of months from 55 to 75 per cent, then it behooves us not to strive continually for greater tonnage, but rather to strive to see that the tonnage we have is sold at a figure which will net a reasonable profit on the basis of contemplated operations.

Self-Education of Management Necessary

"Each manager should educate himself (for it needs self-education in the case of each and every one of us, no matter how firmly we may be convinced that it is needed only by our competitors) to realize that if he quotes 7.50c. on a job which will cost him 6.75c., he is really interested only in the top 0.75c., and that if he allows the purchasing agent or his own salesman to cajole him into cutting the price 0.50c. he has wiped out two-thirds of his profit, while saving the buyer but a meager 6 per cent on his purchase. He must lose no opportunity to impress on his sales force, to iterate and reiterate that the thing he is interested in is not primarily tonnage, but profit, and that in the scramble of competitive selling he prefers the man who has the nerve and the judgment to let the unprofitable order go to the other fellow.

"Fussy" Buyer Should Pay More for Castings

"Successful merchandising would indicate that with an industry running around 55 to 75 per cent unusual care should be used in scrutinizing each account to see that so far as possible every order and every pattern bears a price which will yield a legitimate profit on the basis of 60 per cent operation. When business is good you can carry some unprofitable accounts without feeling it, but when business is poor their effect is very much more vital. Each account should be periodically and carefully scrutinized to determine as accurately as possible whether it is paying its own way. The customer who orders in small quantities, the customer who is exceedingly finicky about the character of his work, who expects to receive better than a good commercial grade of product, who requires unusual service in the way of deliveries or of attention, should pay more for his castings than the man who does not expect so much.

"Many a foundry loses money because it tries to cover too large a range of product. Having a wide range of melting capacity, it stands ready to take anything offered, forgetting that the making of a proper mold is somewhat of an art, akin, perhaps, to the chiseling of a statue, and that the best money can be made in those ranges of work in which its molders have the greatest experience and skill. Oftentimes losses can be saved by eliminating certain lines of work, not because the work in itself is undesirable, but because it does not fit the particular shop or particular organization."

New Officers of Testing Society Nominated

Nominations of officers of the American Society for Testing Materials for the coming year are announced as follows:

For President:

H. F. Moore, professor of engineering materials, University of Illinois, Urbana, Ill.

For Vice-President:

T. D. Lynch, manager materials and process engineering department, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

For Members of Executive Committee:

F. O. Clements, director of research General Motors Corporation, Detroit.

W. H. Klein, general superintendent Dixie Portland Cement Co., Richard City, Tenn.

F. C. Langenberg, metallurgist, Watertown Arsenal and metallurgist, Climax Molybdenum Co., New York.

F. N. Speller, metallurgical engineer National Tube Co., Pittsburgh.

Formal elections of these officers will take place at the annual convention at French Lick Springs Hotel, French Lick, Ind., the week of June 30.

The new ingot mold plant of the Shenango Penn Mold Co., Sharpsville, Pa., has been completed and recently made its first shipments of molds.

Powdered Coal and Gas Cleaning

Special Features of Colorado Steel Company Electrification—Electrical Precipitation of Dust Results in Distinct Fuel Economies

OUR issue of April 28 carried the main power features of the electrification of the Colorado Fuel & Iron Co. plant, Pueblo, Colo. This second and concluding portion of the article deals primarily with the production of the powdered coal used as boiler fuel and with the gas cleaning plant. The latter, which is on the Cottrell electrical precipitation principle, permits the blast furnace gas to retain its sensible heat and thus conserves fuel. The material for the article was prepared by H. W. Neblett, chief engineer for Wilfred Sykes, consulting engineer, Chicago.

Powdered Coal Plant

A CENTRAL coal pulverizing plant (Fuller-Lehigh Co.) with a capacity of 18 tons per hr. is installed in a separate building (48 x 66 ft.) about 100 ft. from the boiler house. This system was decided on rather than a unit system for each boiler, on account of less total pulverizing capacity required, elimination of raw coal conveying and storage equipment in the boiler house, and greater flexibility.

Since powdered coal is used mainly as an auxiliary fuel, comparatively little coal is required over a period of a day or week, but demand may be heavy for periods up to a half hour, due to a shortage in gas supply when furnaces are casting or are down for changing tuyeres, etc. With a central coal pulverizing system and powdered coal storage bins at the boilers, these heavy momentary demands can be taken care of with comparatively small pulverizing equipment.

The advantage of the unit system in not requiring the coal to be dried first was not a factor in this case, because the coal in this territory contains little moisture and usually can be pulverized and stored without drying. However, a dryer is included in this installation for use at times when the surface moisture of the coal is high on account of transporting through rain or snow. Pulverized coal can be stored in the bins above the boilers for several days, as the temperature around the bins is sufficient to prevent its caking.

The coal-pulverizing equipment includes three rotating ball-screen type pulverizing mills with a capacity of 6 tons an hour each. There are one indirect fired rotary coal dryer, two 6-in. Fuller-Kinyon pumps, one 50-ton raw coal bin and one 40-ton dried coal bin. One automatic skip hoist with a capacity of 50 tons an hour handles raw coal from track hopper to receiving hopper. The necessary auxiliary transporting and conveying equipment is installed, including conveyors, chutes and spouts, magnets for removing iron from coal, dust collectors, vent piping and air compressors.

Slack coal from the company's mines, or screenings from the coal delivered to the coke plant, is unloaded into a track hopper alongside the powdered coal plant. Taken by a skip hoist to the top of the building, the coal is dumped into a hopper from which it passes over a magnet for removing tramp iron. It is then conveyed either to the raw coal bin or to the dryer.

After passing through the dryer it is delivered to the dry coal bin. From either the dry or raw coal bins the coal is fed by gravity into the pulverizing mills. The pulverized coal is delivered from the mills by the Fuller-Kinyon pumps, after it has been sufficiently aerated to flow freely, through a 5-in. transport pipe to the storage bins above the boilers. A remote control and signal system, installed in connection with the

General View of the Coal Pulverizing Plant. The pulverizing mills are on the platform behind the railing, each driven by its individual motor. Below in foreground are two pumps for distributing the powdered coal through the system. Conveyors and a portion of the control and signalling system appear also

transport and storage system, allows the operator to control the flow of coal into any storage bin, and also indicates which bins are full or need replenishing.

Gas Cleaning Plant

EACH blast furnace produces an average of 55,000 cu. ft. of gas per min. measured under standard conditions of 60 deg. Fahr. and 30 in barometer. This gas leaves the furnace at about 400 deg. temperature and contains an average of 4 grains of dust per cu. ft.; at times this will be as much as 6 grains.

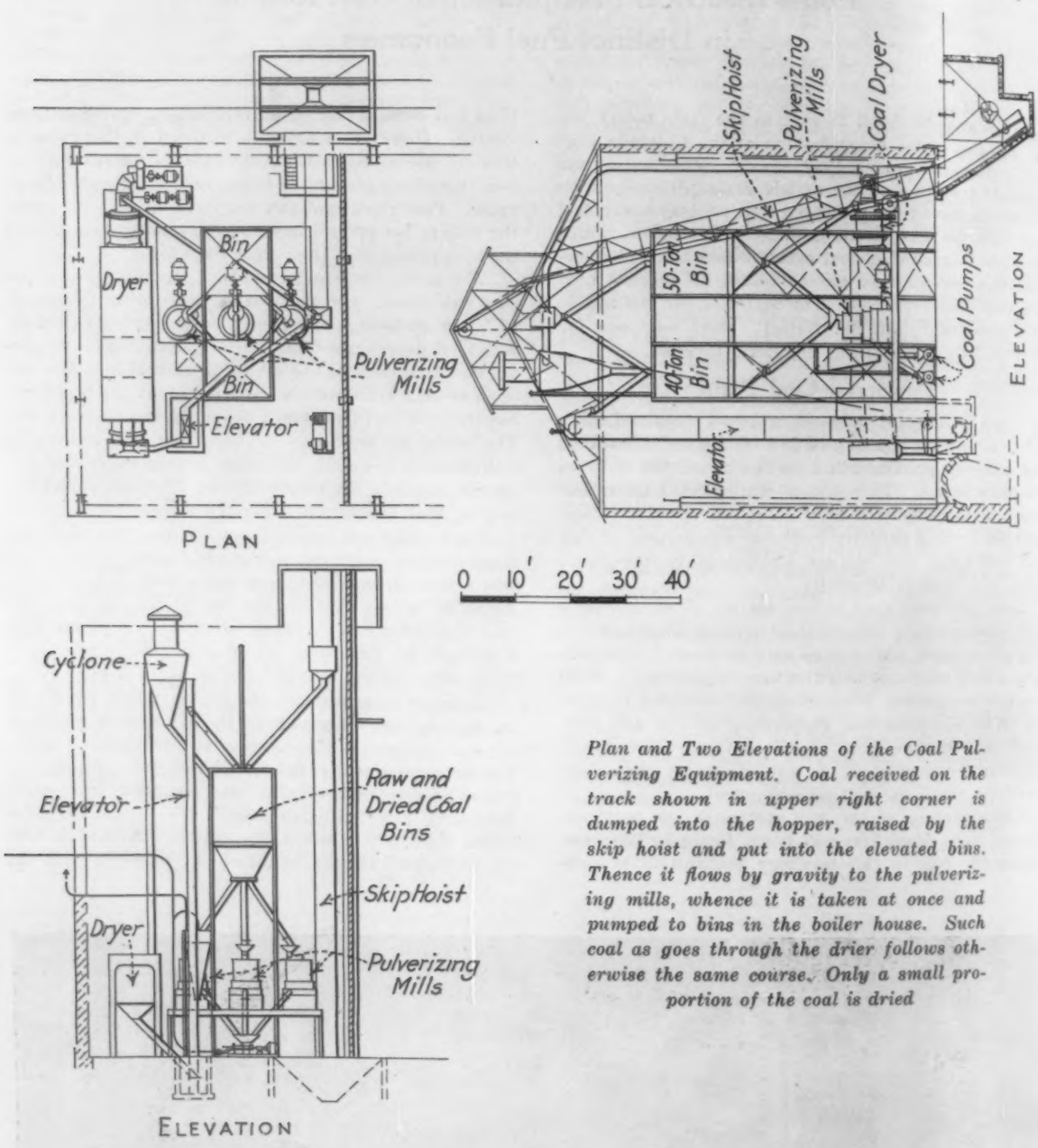
This dust is composed of 42 per cent iron and 11 per cent carbon from coke; the remainder is dust from limestone and ordinary dirt from the ore. On account of its high iron content, this dust, is valuable after being recovered and prepared in a sintering plant for recharging into the furnaces. Dust left in the gas will seriously interfere with the efficiency of the gas as a fuel, as it will be deposited as slag on the boiler tubes and settings, and on the brick checkers in the stoves.

Approximately 30 per cent of the total gas from the blast furnace is used, after cleaning, for heating the stoves. The remainder is used at the boilers for making steam.

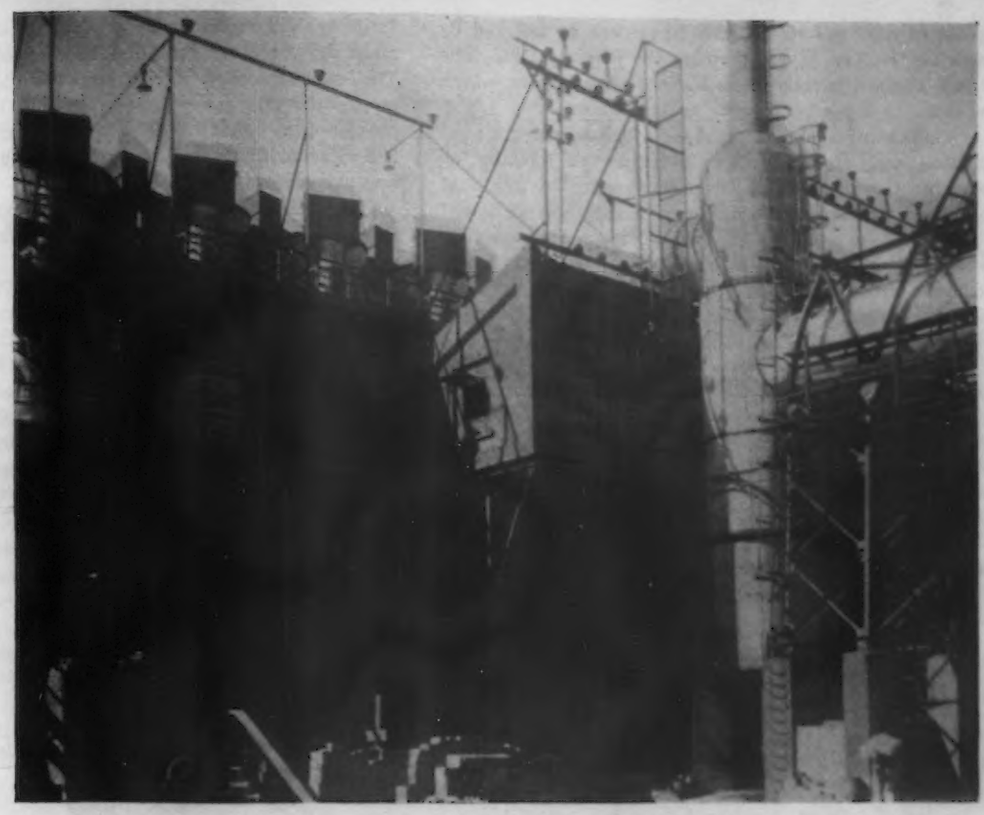
Electric precipitation of the dust in the gas, on the Cottrell system, is employed here. This consists of passing the gas through tubes or between partitions, in the center of which are suspended small wires insulated from the tubes or partitions. A high-voltage uni-directional current being applied to the wires, the particles of dust in the gas pick up a charge when passing through this zone and are deposited on the walls of the tubes or partitions. At regular intervals, about once an hour, the current and gas are cut off from each unit and the tubes or partitions rapped. This causes the dust to drop into the lower part of the cleaner, whence it is discharged into a bin, and into railroad cars which take it to the sintering plant.

[See THE IRON AGE of Feb. 7, 1924, page 422; Aug. 28, 1924, page 502; Nov. 11, 1926, page 1345, for illustrated descriptions of this process and the method of control.]

The original installation at Pueblo consists of 16 units. Each unit has a capacity of 10,000 cu. ft. of gas per min., or a total capacity for the installation of 160,000 cu. ft. of gas per min. at 380 deg. Fahr. The present units clean the gas from two blast furnaces. Additional units are now being installed which will give a total capacity for this plant of 360,000 cu. ft. of gas per min.



Plan and Two Elevations of the Coal Pulverizing Equipment. Coal received on the track shown in upper right corner is dumped into the hopper, raised by the skip hoist and put into the elevated bins. Thence it flows by gravity to the pulverizing mills, whence it is taken at once and pumped to bins in the boiler house. Such coal as goes through the drier follows otherwise the same course. Only a small proportion of the coal is dried



All of the Electrical Precipitators Are Mounted on a Platform, as Shown in This View from the Yard. The brick structure contains the electrical apparatus for this portion of the gas cleaning plant

The present precipitator units are known as the tube type, each unit having 90 pipes 6-in. in diameter. The units now under construction are the plate type, consisting of a series of plates or partitions between which the electrode wires are installed. The latter units are much cheaper and simpler in construction.

Electrical equipment for the precipitators, located in a house adjacent to the unit, includes rectifiers, transformers, switching equipment and control switchboard. There is installed also an automatic electric timing and rapping control. This control automatically cuts off the gas and electrical supply to each unit, raps the dust from the tubes, closes the electric circuit and opens the gas supply valve. This is entirely automatic and requires no attention from the operator: the units are rapped one at a time, in sequence. The interval between rapping periods can be varied over a range of 20 min. to 1 hr. In addition, a push button is provided on each unit panel which enables the operator to rap any unit at will, in addition to the regular rapping period.

While the cleaned gas contains an average of 0.2

Gas Cleaning Plant Viewed from Above. The 16 electrical precipitators and the gas mains are shown, with the power house at the right, and blast furnace D in the middle background

grain of dust per cu. ft., this figure can be reduced by slowing the flow of gas through the precipitators. The gas is cleaned without reducing the temperature, which adds about 3 per cent to its heating value.

Absence of moisture provides a better gas for combustion and eliminates the necessity of flushing or washing out the gas mains or burners. The dry dust is easily handled, flows by gravity from precipitators to railroad cars, and is in ideal condition for sintering and returning to the furnaces. This converts a by-product, ordinarily perplexing to handle, into an iron-bearing material that is of real value in the furnace charge.

Power required for operating the gas-cleaning plant totals 80 kw. The equipment, being automatic in operation, requires a minimum of labor and supervision. Maintenance is negligible, operating cost is low, and the annual return on the investment is approximately 30 per cent, based on the increased fuel efficiency of the cleaned gas and the value of the dust recovered.

This gas-cleaning plant has been in operation one year and has proved entirely satisfactory. It is the only commercial installation of electric precipitators in America for cleaning the total gas delivered by blast furnaces. The gas-cleaning plant building is 42x170 ft.

Distribution and Consumption of Power

CURRENT is distributed from the power house at 6600 volts, 3-phase, 60 cycle a.c., and as 250-volt d.c., on an overhead system supported on structural steel towers. Lightning arresters are installed at both the power house and distributing or mill ends of the circuits. The 6600-volt a.c. power goes on individual lines to each mill or department. The 250-volt d.c. power goes into a general d.c. distribution system for the plant.

Motor-generator sets in the power house supply d.c. current to that part of the system in its vicinity. They also connect by means of tie lines to other centers of d.c. distribution, such as the rod mill, in which two 1000-kw., 250-volt d.c. motor-generator sets are installed. The motor rooms of the different mills act as substations in which the 6600-volt lines from the power house terminate in a bus structure, to which are connected the motors, motor-generator sets, rotary converters and transformers.

Electrification of the plant to date includes electric main drives for the following mills: Rail mill; 14-in. merchant mill; 25-in. structural and merchant mill (new); rod and 10-in. mills. Electric service is supplied to the other departments of the steel plant for general power and light. A transmission line extends about 6 miles from the plant, to supply the company's limestone quarry.

A typical motor room is that of the rod mill, the main drive motors installed here exceeding 11,000 hp. The constant-speed drives are 660-volt a.c. induction motors directly connected to the mill rolls through reduction gear sets. Where variable speed is required, 600-volt variable-speed d.c. motors, supplied from rotary converters, are installed.

Electrification of this steel plant has resulted in a great saving of fuel, maintenance, labor and operating costs. The saving in coal alone will amount to over 150,000 tons per year, which will be further increased with the completion of the electrification.

Increased production has resulted from the installation of electric drive on the mills. Every mill electrified has, since electric drive has been installed, exceeded all previous production records. Mill speeds remain the same as originally. The increased production is due to a more uniform mill speed being maintained than was possible with steam engine drive.

The normal weekday electric load on the power house varies from 16,000 to 19,000 kw., depending on the demand from the mills.

The power plant and steel plant electrification was designed, and its construction supervised by Wilfred Sykes, consulting engineer, Chicago. The electrical equipment, including generators, main drive motors, switchboards and switching equipment was installed by the General Electric Co. The modern and well organized machine shops and construction department of the Colorado Fuel & Iron Co., handled all construction work, including fabricating the structural steel and making all castings.

Typical Motor Room for Rolling Mill. These motors drive the rod mill, the total power involved here being more than 11,000 hp.

Allis-Chalmers Acquires Pittsburgh Transformer Co.

The Allis-Chalmers Mfg. Co., Milwaukee, has acquired the Pittsburgh Transformer Co., Pittsburgh. The transformer business of the purchasing company runs about $4,000,000 annually and that of the Pittsburgh company approximately $6,000,000. The purchase gives the Allis-Chalmers company a Pittsburgh plant as the Pittsburgh company is to be maintained and operated as a subsidiary. R. V. Bignay, president of the acquired company and its principal owner, will remain as its president and directing head and will become a director of the parent company.

The Chicago, Milwaukee & St. Paul Railway on May 21 will put a train in operation between Chicago and the Twin Cities which will be equipped throughout with roller bearings. Within the next two months the company expects to have a fleet of 12 trains, comprising 127 cars, similarly equipped.

Live Topics in British Program

Capital Expenditure and Manufacturing Costs, Blast Furnace Reactions, French Steel Industry, Manganese Ore and Alloys Discussed by Iron and Steel Institute

(*Special Correspondence*)

LONDON, ENGLAND, May 6.—The annual meeting of the Iron and Steel Institute opened in London yesterday, in the hall of the Institution of Civil Engineers, Sir Peter Rylands, the retiring president, occupying the chair. The annual report shows that the total membership of the institute on Dec. 31, 1926, was 2015.

In the past year two honorary members have been added to the list—Dr. Emil Schrödter, late secretary of the German Society of Ironmasters, Düsseldorf (who was originally elected an honorary member in 1911), and Mr. Kjellberg, Stockholm.

Prof. H. C. H. Carpenter, in presenting the balance sheet and statement of accounts for the past year, said it was not surprising that the conditions prevailing in the metallurgical industries throughout most of last year had reacted to some extent on the institute, and that the accounts for 1926 again showed a deficit, though fortunately of smaller amount than that of the previous year. The debit balance at the end of 1926 was, in fact, £24 as compared with £132 at the end of 1925. He felt that the members might congratulate themselves that the position was no worse.

The Williams Prize, founded by the munificence of Illtyd Williams, the former treasurer, figured for the first time in the accounts. The donation consisted of £3,000 of 3½ per cent conversion loan, valued at £2,220 in the books. The current year, 1927, was, however, the first year in which the scheme would become fully operative, and it was not until the end of this year that the council would be able to announce the first results.

The president then introduced the new president, F. W. Harbord. [A sketch of Mr. Harbord's career appeared in THE IRON AGE, April 21, page 1167.] The council, he said, had very great assurance in saying that the new president would be one who would commend himself most cordially to all members and command their confidence. They all knew the great and valuable services he had rendered to the industry on the technical side of iron and steel, and he would be a worthy successor to the many brilliant metallurgists who had occupied the position of president.

The new president, Mr. Harbord, thanked Sir Peter Rylands, and said he felt that it was a great responsibility to occupy the chair of the Iron and Steel Institute. He also felt it difficult to find words in which to express his appreciation of the great honor that had been conferred upon him. He could only say that, relying upon the support of the members, he would do his utmost in every way to maintain the traditions and uphold the prestige of their institute.

Sir Robert Hadfield, a past president, said he was sure the members would want a cordial vote of thanks expressed to the retiring president, Sir Peter Rylands, for his excellent services. Sir Peter came forward at a time when it was quite necessary to have his immediate help, because some of those who were vice-presidents were not able to go on to the chair, and the members were therefore greatly indebted to him for having undertaken the office and for maintaining in so admirable a manner the traditions of the institute. The past year had been a most difficult one in many ways for the iron and steel industry, and no one had tried to do more than Sir Peter had done in every way by acting as a mediator in the very difficult questions that had come forward for settlement.

Bessemer Medals Awarded—President's Address

THE president then announced the presentation of the Bessemer medals which had been awarded by the council. As the members were aware, he said, it was usual to present one Bessemer medal annually, but on one or two exceptional occasions when, in the opinion of the council, two men working independently had in different ways equally contributed by their work to the progress of the industry two medals had been given.

Work of Swedish Metallurgists Recognized

Such an occasion had arisen that day, and it was felt that full recognition of the great work of Swedish metallurgists could only be adequately given by conferring two medals, one on Mr. Wahlberg, as representing the more practical side, and the other on Dr. Carl Benedicks, as representing scientific metallurgical research.

Axel Wahlberg First One Honored

Axel Wahlberg was so well known all over the world that it was necessary for him to say very little. In his early days he was director of the Government Testing Institute at Stockholm, and afterward while professor at the Royal University was editor of the *Jernkontoret Annaler Journal*, one of the oldest, if not the oldest, technical journal in the world. As colleague of the great Doctor Brinell, and afterward his successor as general manager of the famous Fagersta Works, he was associated with that famous metallurgist in much of his experimental work, and finally on Brinell's retirement from the position of chief technical adviser to the *Jernkontoret*, Mr. Wahlberg was selected to succeed him in that important position.

From his earliest days Mr. Wahlberg had been most intimately associated with all modern developments in the metallurgy of iron and steel in Sweden. By his sound knowledge and wide practical experience he had rendered the greatest service in the investigation and development of many new metallurgical processes, particularly in the smelting of iron ores in the electric furnace, and had taken an active part in the development of Swedish iron ore resources. He had repeatedly represented his government in negotiations with this and other countries both during and since the war, when delicate questions of the highest importance of both a technical and industrial nature had to be dealt with, and by his ability, fairness, tact and sound judgment he had won the respect and esteem of all. He had the greatest pleasure in presenting Mr. Wahlberg with the Bessemer medal, the highest honor which the

institute could confer, in recognition of his great services to practical and general metallurgy.

Dr. Carl Benedicks Also Honored

Addressing Doctor Benedicks, the president continued that, as representing the scientific side of metallurgy, Doctor Benedicks had earned a world-wide reputation by his researches into the constitution of metals and the physics of metallurgy. While demonstrator of physical chemistry at Upsala University he commenced, and afterward as professor of physics at the University of Stockholm continued, to carry on his investigations, and since 1920, as director of the Metallographic Institute of Stockholm, he had devoted all his energies to the study of the molecular changes in-

DR. Carl Benedicks, eminent Swedish metallurgist, is well knwon in the United States. In February, 1925, he delivered the Institute of Metals division annual address in New York and lectured before various groups

duced in metals by heat treatment and generally elucidating the many intricate problems connected with metallurgical physics. His publications were too numerous to mention, and the institute had been favored by many of his papers giving the results of his researches.

He was one of the honorary vice-presidents of the institute, and had had many honors conferred upon him both by his own and other countries. The council felt that there was no one who more worthily deserved the highest honor they could confer than Doctor Benedicks because of his great researches in metallurgy. He had the greatest pleasure in presenting to him the highest honor which it was in the power of the institute to confer.

Mr. Wahlberg Replies

Axel Wahlberg, in acknowledging the presentation of the medal, said the institute had twice before conferred the Bessemer gold medal on Swedish metallurgists—first in 1895 on Prof. Richard Akerman, who was also an honorary member of the institute, and second in 1907 on Dr. J. A. Brinell, to whom the president had just referred. He had the good fortune of having Professor Akerman as his teacher in metallurgy at the Royal Mining School in Stockholm. As it happened he (Mr. Wahlberg) was his last pupil before Doctor Brinell resigned. He met Doctor Brinell somewhat later on in 1896 and they collaborated together during many happy years.

Both Brinell and Akerman were intimately connected with the institution with which he (Mr. Wahlberg) was connected at present—the old Jernkontoret in Stockholm. He desired frankly to say that in most gratefully accepting the Bessemer medal which the president had rightly said was the highest honor the institute could confer, he considered it as a wonderful tribute to Jernkontoret and to what that institution had achieved for nearly two centuries past in the advancement of scientific and practical metallurgy.

Doctor Benedicks Accepts

Prof. Carl Benedicks, in reply, said that the first Bessemer medal was given in 1874 to Sir Lowthian Bell, and the last one to his son, Sir Hugh Bell, in 1926. Sir Lowthian, after receiving the medal, said that "It became his duty to thank them as he best might—and he was sure that would be most imperfectly—for having made him the recipient of that distinguished mark of their kindness and generosity." Sir Hugh, also after receiving the medal, expressed his surprise, after looking down the list of the distinguished names associated with the medal, in finding that he was to be included in the list, and said he had protested against the choice of the council as not being worthy to appear. If Sir Lowthian Bell and Sir Hugh Bell found difficulties in knowing how to express their gratitude, the members would appreciate the difficulties felt by a humble person like himself.

There were, however, a few words he desired to say. When reading that fascinating book, the autobiography of Sir Henry Bessemer, he was struck by one fact, that Sir Henry, in his father's works, always had access to molten type metal. It appeared to him quite uncertain if Sir Henry would ever have conceived the idea of handling molten pig iron in the admirable way he did, had not molten metal been as familiar to him as mother's milk. Sir Lowthian Bell, in the introduction to his volume on iron smelting, published in 1872, pointed out the fact that he had been connected with the manufacture of iron for more than 25 years, and Sir Hugh Bell, when receiving the medal, said he had been connected with the iron industry in his father's works for 32 years.

If it had been possible for him (Doctor Benedicks) to do anything of value concerning medals, it was no doubt due to an early family contact with the iron industry. It appeared to him there were few regions of human work where advances were so dependent on a sound tradition, on a continuous development of the social structure, on the very environment as was the case with iron and steel. He thought that was the reason why such a distinguished British corporation as the Iron and Steel Institute had been able to do such an enormous amount of work in advancing progress.

He knew from experience that when at the meeting of the Iron and Steel Institute 19 years ago, he received the Carnegie gold medal from the hands of Sir Hugh Bell, that was not only an incitement to him to do his very best, but it was also extremely helpful in promoting the foundation of the Metallographic Institute at Stockholm now in existence. That institute had also received extremely valuable help from one of the most distinguished members, in fact, one of the pillars of the institute, Sir Robert Hadfield. He desired to point out that his friend, Mr. Wahlberg, had done more than anybody else toward establishing the economical basis of the Metallographic Institute. That implied no criticism of the excellent words expressed by the president, but he considered that side of Mr. Wahlberg's work of extreme importance.

President Harbord Discusses Capital Expenditure and Costs

THE new president, in his address, said that, since the introduction of the Thomas Gilchrist basic process, there has been no fundamental discovery which has materially affected the steel industry as a whole, nor is there an indication of any new process, either in iron or steel manufacture, which is likely to change present methods of manufacture. Such improvement as may be possible must be effected by the necessary modifications in plant at a minimum cost and by giving greater attention to detail in working.

Manufacturing Costs and Capital Expenditure

The main features of the president's address were, first, capital expenditure in relation to manufacturing costs, and questions relating to works practice which seem to offer possibilities of increased efficiency and economy. Mr. Harbord estimated that about the year 1890 a complete iron and steel plant in England, designed for rolling rails and sections, with all accessories—railroads, water service, loose tools, etc.—cost about £4 to £4 10s. per ton of output of finished rails or structural steel, and that the actual cost of a similar plan in 1910 to 1912 was about £6 10s. to £7. In America the cost of a modern iron and steel plant, complete with blast furnaces, in 1910-1912 is given as from £9 to £10 per ton of output.

(*Continued on page* 1491)

Machine Builders' Jubilee Meeting

Investment and Profits, Training Leaders, Exposition, Single Bid Policy, Used Tools, German Competition Among the Topics

DECLARED by those present to be the best meeting, as well as the largest, in the 25 years of the history of the association, the anniversary convention of the National Machine Tool Builders' Association was held at the Hotel Thayer, West Point, N. Y., May 10, 11 and 12. Registration included 92 representatives of member companies and 23 guests, a total of 115. The meetings were presided over by James E. Gleason, president of the association, and president and general manager, Gleason Works, Rochester. Technical and business meetings were held in the ballroom, while the dinner celebrating the silver anniversary was in the grill room, of the hotel.

Three general sessions, aside from the initial get-together session, were devoted to broad discussion of general problems affecting the industry. The first of these sessions was given over to a consideration of the question of investment and profits—a proper capital structure for a machine tool concern and what that concern ought to earn against that capital. The second general topical session was devoted to the proper safeguarding of machine tools. The third consisted of informal discussions on topics of general interest, going into standardization, foreign competition and general sales practices.

Group Meetings Interspersed

Accessory to the general meetings were the usual group meetings of those interested in particular types of machines. These were discussions of problems affecting particularly the groups, rather than the entire organization, and were concentrated into Wednesday morning and Wednesday evening. Except for the grinding machine group, no reports were made to the convention as to any action taken.

H. W. Dunbar, assistant general sales manager Norton Co., Worcester, chairman of the grinding machine group, reported that a sub-committee covering the tool and cutter grinder manufacturers voted to collect, by units, statistics of sales, production and stocks. These are to be cleared monthly through the association's office in Cincinnati in two classes—those selling above $500 and those below $500. The grinder group recommended that the cost accounting system prepared for the association by Scovell, Wellington & Co., 270 Madison Avenue, New York, be analyzed by a committee to be appointed by President Gleason, and then be so arranged for the use of the grinder manufacturers that it could be understood readily by those not particularly versed in accounting methods.

Initial Session

IN his address to the conference President Gleason reported that only two companies of the 13 which first united in June, 1902, at the Waldorf-Astoria Hotel, New York, have withdrawn from the association. Eleven of the founder members are still active. He paid particular attention to the question of standardization, which had been advocated by William Lodge at the very beginning of the association, and which first took real effect about 1910, when a committee arranged for standardizing motor connections on machine tool bases.

Business ethics are represented in a code drawn up three years ago. Mr. Gleason believes that the application of this code has drawn the members closer together on the slogan of "Fair play and let the best man win." He questioned the final usefulness of business taken below normal costs and asked whether it was considered fair to other concerns to do business on that basis. Referring to the uniform cost system established for the members in 1923, he pleaded for a proper basis for setting up reserves. One item of cost, which he said has yet to be determined, is that of idleness.

Machine Tool Exposition

Turning then to a more material side of the association's work, he characterized as the greatest single cooperative effort in its history the forthcoming machine tool exposition in Cleveland. England, France and Germany are all known to be sending large delegations to this exhibition, while visitors from other foreign countries will certainly be there.

In connection with the competition of foreign machine tool makers, he quoted figures from the April 7 issue of THE IRON AGE [see page 1012] to the effect that exports of power-driven metal-working machine tools in the first two months of this year had aggregated $1,500,000, against imports of only $65,000.

Each of the last three years has given successively greater business to the machine tool industry than the preceding year. Unfortunately this growing achievement has been arrested and the picture is changing. Automobile makers, constituting the largest single outlet for machine tools, have slowed up in their output and particularly, it is believed, there will be small opportunity to sell additional tools to that industry for some time to come. They are already equipped.

Tribute to Labor Efficiency

Never in the history of the industry has labor been more efficient than it is today, is the opinion of President Gleason. This being the case, it is essential that we conserve this efficiency by keeping the organizations together to the greatest possible extent, regardless of momentary business conditions. It is becoming increasingly a responsibility of management, thus, to avoid peaks and valleys in the curve of their employment.

To bring out advanced designs of machines and attachments means considerable engineering cost. It is necessary in the regular day-by-day conduct of business to build up a reserve out of which this cost can be met. Only by producing new machines, of greater capabilities in earning power than the old, can new business be properly stimulated.

Committee Reports

Treasurer Edward A. Muller (vice-president and general manager King Machine Tool Co., Cincinnati) reported on the finances of the past six months and estimated that at the end of the year the net worth of the association, in cash and securities above indebtedness, would be $15,187.

General Manager Ernest F. DuBrul reported that there are 121 members in good standing. There were nine new members added during the year and one resignation from a company in process of liquidation. There have been increasing calls for service made by members upon the general manager's office. In the great majority of instances, data and other information required have been furnished promptly by his office, on the basis of a large mass of data built up in the course of the preceding years.

Mr. DuBrul read portions of a statement made by one of the General Motors officials in which the question

of profits and reserves was taken up in a particularly satisfactory way. It was pointed out that the permanent welfare of the owners of a business necessitates adequate profits. Only thus can the specialized knowledge and skill required in making the product and in selling it be held together.

Favors Plan for Industrial Preparedness

President Gleason appointed a resolutions committee, consisting of O. B. Iles, president International Machine Tool Co., Indianapolis; A. H. Ingle, president Consolidated Machine Tool Corporation of America, Rochester, and G. E. Randles, president Foote-Burt Co., Cleveland. One of the resolutions reported by this committee at the final meeting Thursday morning was in substance as follows:

Be it resolved that the National Machine Tool Builders' Association declare itself in hearty accord with the plans for industrial preparedness now being carried into effect through the office of the Assistant Secretary of War of the United States, and that the members of the association be urged to cooperate to the fullest degree.

Training Future Leaders

Training of owners' sons formed the subject of an interesting address by William A. Viall, vice-president, Brown & Sharpe Mfg. Co., Providence. This paper is reported practically in full elsewhere. In the discussion, various speakers told of their experiences in bringing up in their business either their own sons or the sons of other executives or owners. It was pointed out that the distribution end is probably the weakest part of the entire machine tool industry. For this reason a son entering the business should have some months of contact with the sales manager and then with outlying sales offices. He must be brought to the conviction that more backbone is required in the maintenance of quoted prices and a fair measure of profit.

J. W. Carrel, vice-president and general manager Lodge & Shipley Machine Tool Co., Cincinnati, reported upon such training. The young man spent two years in the shop learning the fundamentals of manufacturing practice. He was with the men throughout his working period, taking his lunch with them wherever they ate and being as much as possible one of them. The superintendent then wanted him as assistant superintendent. This was amended so that he went into the office as assistant to the superintendent—a vital distinction.

After about a year in that position he is scheduled for the general office, working for a time with the office manager, then in the sales department. From here he is to go all over the United States, visiting sales offices and agencies of the company and becoming thoroughly familiar at first hand with their local, as well as their general, problems. A trip to Europe lasting several months will familiarize him with conditions in the export business and with the competitive condition abroad. This will give him an insight not only into European practice in the design and building of machine tools and in shop operating methods, but also into sales policies and characteristics.

Investment and Profits

LEADING the discussion on the proper investment of a machine tool concern turning out a specified quantity of products, General Manager DuBrul set up a series of figures as a target for consideration by the members. He referred to his hypothetical company as a competitive company, in that it would be without great protection from patents. It would be of a size about equivalent to the average of the bulk of the industry, in which two-thirds of the companies are turning out upward of $1,000,000 of products per annum, with an average of perhaps $2,500,000. Mr. DuBrul placed the normal output of his hypothetical company at $1,000,000 a year.

Figuring annual production of $4,000 for each wage earner, the company would have 250 shop men, in addition to its office force. The shop will require an average of about 300 sq. ft. of floor area per man. This connotes a working space of 75,000 sq. ft. It must be a modern shop, well lighted and well equipped, calling for an investment of about $3 per sq. ft. of floor area, or a total of $225,000 for the building.

Location must be in a center were labor is plentiful. This means such a place as Rochester, Providence, Worcester, Cincinnati, etc., so that men may be obtained when needed, and so that periods of industrial depression would not require the company to carry men on its payroll without having work for them to do. In such a center, the 2½ acres of land, considered necessary by the committee, would cost about $10,000 per acre or $25,000 in all, bringing the investment for land and building up to $250,000.

Modern equipment, including tools, cranes, etc., is figured at $1,000 per operative or another $250,000. Inventory was calculated at an average turnover of two and one-half times a year, or $400,000. Receivables on the books at an average date, while billed at 30 days net, were considered to represent an average of about 45 days collection, due to inevitable delays. This is one-eighth of a year and represents $125,000 at any one time. The cash balance should equal the receivables, while the company's reserve to tide it over periods of depression was placed at $350,000. Thus the total capital figures out at $1,500,000.

Return on Investment

Stockholders were declared entitled, in a competitive business, to 15 per cent dividend upon the money invested. This was predicated upon a number of business risks, such for instance as the calamity which might attend the death of a single key man in the organization, the fluctuating nature of demand, and other conditions vitally affecting the industry.

In addition to the dividends for the stockholders, the company must have earnings on which it can grow and from which it can replace general obsolescence. These earnings were tentatively estimated at 10 per cent more on the investment. To meet income taxes and other special charges against earnings would require another five per cent, or a total of 30 per cent. This would aggregate, on a capital of $1,500,000, an earning requirement of $450,000 a year.

Considering that the average machine tool property runs during an average year at about 60 per cent of capacity, the business of our hypothetical company is placed at $600,000, in place of its nomal $1,000,000. The question then was asked whether $450,000 can be earned upon $600,000 of business. It may be evident that, if the owners of this business are satisfied with less than the 30 per cent of the above analysis, and can keep things going on that lower return, their competitors will have to adjust themselves to the price policy accompanying the lower return. Is 30 per cent too much?

E. B. Gardner, president Badger Tool Co., Beloit, Wis., expressed the opinion that cutting prices does not help a particle in expanding markets for a tool. August H. Tuechter, president Cincinnati Bickford Tool Co., thinks 30 per cent is too high a figure at which to aim. Other speakers attacked the figure of $4,000 output a year for each man. One member considered it entirely too low and pointed out that, if this figure were boosted, the result would be to cut down the entire investment required to produce $1,000,000 of product per year, and thus call for a considerably lower return upon the business done.

Census Returns Used

In reply to this point, Mr. DuBrul stated that the figure was based upon returns made to the United States Census Bureau by the manufacturers of machine tools themselves. In the 1919 census the average figure worked out for the entire industry at $3,999, on the basis of wage earners only. In 1921 the figure was $3,178, being much lower because of the great depression that year. In 1923 the figure was $4,113. That for 1925 has not yet been announced, but the committee thought $4,000 a fair average.

J. B. Doan, president and general manager American Tool Works Co., Cincinnati, expressed the opinion that the value of output per man depends largely on the particular product being made. It depends also on whether there are lively patents and whether there

(*Continued on page* 1495)

Open-Hearth Furnace Discussion

Yield and Practice—Proportion of Pig Iron in Charge—Condition of Lime Addition—Research Suggestions

LAST week the main features of the proceedings at the semi-annual open-hearth meeting in Buffalo were published. Exigencies of space made it necessary to defer the remainder until this week. In the paragraphs below are carried a number of the topics reported upon and discussed at the meeting, together with the general summary of the attitude of those participating with regard to the work they were doing.

Some of the men present expressed their conviction that the meetings were about as important to their work as anything they had encountered in the past. It gives them personal acquaintance with men engaged in solving similar problems under differing conditions. It thereby furnishes an entry which is much more likely to achieve an adequate answer than a letter directed merely to a company, and possibly reaching a man who never had heard of the original writer. Exchange of ideas thus becomes a matter of more than the mere three days of the meeting. It persists in correspondence between meetings and should be mutually helpful all along the line.

Standardized Method of Reporting Furnace Yields and Practice on Such Yields

STARTING the discussion on furnace yields, James J. Bowden defined the term as the ratio of the useful ingot tonnage to the total metallic charge. In figuring the metallic charge he would include the gross weight of all the iron, scrap and ferroalloys put into the furnace and a percentage on the ore, depending upon its quality. He stated that the nature of the charge has a strong influence, particularly when it comes to widely varying percentages of pig iron, or the use of very light scrap.

Oxidation losses in a shallow bath are higher than in a deep bath. In making low-carbon steel there is a greater oxidation loss, because of the longer time in the furnace and the higher temperature. This length of time in the furnace again furnishes a loss of oxidation. The use of burnt lime saves some of the oxidation losses, as compared with raw limestone. In figuring the yield, the weight of butts and pit scrap should be added to that of the ingots. This material then would be charged against a future heat. Mr. Bowden's estimate of a good yield was given at from 90 to 93 per cent. His optimistic figures evoked laughter.

Practice from Many Plants

Other speakers reported yields varying from 84 per cent when very light scrap was used, to a maximum of 92¼ per cent. Most of them expressed the belief that any yield reaching 90 per cent was "mighty good." Much difference was expressed as to method of figuring various component parts of the charge and, of course, a difference in yield was indicated when there were great differences in characteristics of the steel made. In one case where practically all the steel is made above 0.15 per cent carbon, a 90 per cent yield was considered excellent. In this case the pit scrap, because of slag and dirt inclusions, is charged as 75 per cent metallic. Butts and skull scrap, however, are rated at 100 per cent and the general charge consists of 45 per cent pig iron and 55 per cent scrap.

Kenneth C. McCutcheon reported rating the scrap, pig iron and ferroalloys at 100 per cent and the ore charged at 60 per cent. On the basis of ingots alone, his yield on 0.08 to 0.12 per cent carbon steels was given as 90 per cent, rising to 92 per cent when the pit scrap is added. With a higher carbon, such as 0.18 to 0.25 per cent, the ingot percentage becomes about 91, increased to 92¼ when pit scrap is added. He pointed out the fact that, in using 45 per cent pig iron in the charge, there is at once a loss of 2½ per cent of the total charge, through the metalloids in the pig iron. A further 2½ per cent, rising in some cases to 5 or 6 per cent of iron, is carried away in the slag. This depends upon the volume of the slag and also upon its iron content, which may vary from 10 to 20 per cent.

Calculations Given

L. F. Reinartz gave some figures for a 200,000-lb. charge which, on a 90 per cent yield, would produce 180,000 lb. of ingots. Using 20,000 lb. of lime and forming a 35,000-lb. slag, he figured about 7000 lb. of Fe_2O_3 in the slag, representing 5000 lb. of Fe or 2½ per cent of the charge. Another 2½ per cent was attributed to pit scrap.

R. L. Leventry declared 90 per cent yield of ingots with soft steel a good figure. He said that his practice does not average more than 87 per cent. Under special conditions, when much slag is flushed off the bath, the figure might drop to 86½ or 87 per cent. A still lower yield, running as far down as 85 per cent, would be obtained when using 70 per cent of hot metal in the charge. J. M. Hughes, Sharon Steel Hoop Co., reported an average yield of 90.2 per cent for the first four months of 1927.

Why Foreign Open-Hearth Furnaces Use Less Pig Iron per Ton of Ingots

REPORTING the use of 75 to 80 per cent of hot metal, E. R. Walker, Broken Hill Proprietary Co., gave a negative answer to the question. He stated that scrap is a scarce article in Australia and such as is produced is so scattered, because of the location of the population around the edges of the country, that its collection would be exceedingly expensive. Consequently his plant uses only such scrap as it can obtain locally, mainly as a by-product of its own operations. He reported a yield of only 84 to 86 per cent, pointing out that there is a loss of about 7 per cent in metalloids alone. His iron ore, which is high in Fe, is high also in manganese, containing 2½ to 3 per cent.

The opinion was expressed that foreign furnaces in general have a larger hearth area per ton of ingot production than is common in the United States. This means a much shallower bath and a faster melt.

What Is the Low Pig Iron Percentage and the High Limit for Quality Steel?

MOST of the speakers on this topic emphasized the necessity of avoiding the use of ore. Iron percentages for best results were given, varying from 41¾ to 50. Much difference in quality of this iron was noted, however. Some difference was occasioned by cold iron as compared with using hot metal, the only percentages reported above 45 being associated with a cold charge. In one case, as high as 55 per cent iron and 45 per cent scrap was mentioned, when spring steel was to be made.

Silicon content of the iron charge was reported variously. Most of the speakers preferred from 1.10 to 1.30 per cent, although two men went as low as 0.80 per cent. Manganese varied in general from 1.50 to 1.75 per cent, although a lower figure is desired for high-carbon heats, running down to 1.25 per cent. In several other cases, however, the manganese runs up to 2 per cent.

In one case, where ore is permitted, the quantity is limited to 5000 lb. in working the heat in a 115-ton charge. No ore is placed in this charge. Another man reported using 12 per cent of lime with a charge of pig iron which ran as high as 0.70 per cent of

phosphorus. He was able to work this phosphorus down to 0.008 per cent to 0.027 per cent, varying with the quality of steel made, which ran from soft up to spring steel. One speaker reported the use of manganiferous ore containing 10 to 14 per cent of manganese, for oreing down his charge. In his case the residual manganese in the bath ran from 0.30 to 0.35 per cent.

Pig Iron Research

PROGRESS in a study of open-hearth heats, using varying qualities of iron, was reported by Dr. C. H. Herty, Jr. Some heats made at the Bourne-Fuller plant with good iron, containing approximately 1 per cent of silicon, were followed by heats using silicon as low as 0.20 per cent, obtained by throwing the blast furnace off its gait. Intermediate figures at 0.79 per cent and 0.39 per cent silicon were used, while the furnace was coming down. All the heats made were rimming steel. The chemical division of the bureau is working on the samples now, as opportunity offers.

All these heats were rolled into 4 x 4-in. billets. Some were then rolled further into rods and some into sheets. These sheets have been galvanized and are being examined. Another test, made at Ashland, Ky. used iron from a furnace which had been shut down for a while, and was running cold.

The speaker suggested taking "off irons" from furnaces as they can be obtained, rather than deliberately making the furnace run badly. This would involve watching matters closely. He expressed the willingness to visit plants not too far away from Pittsburgh, and to conduct the tests as the iron becomes available.

What Effect Have Limestone Additions on the Bath as Compared with Burnt Lime?

DOCTOR HERTY favors the use of limestone, as it gives an agitation which easily oxidizes out the carbon. The choice, however, depends somewhat on what kind of steel is wanted and what action is desired. L. F. Reinartz pointed out that with the limestone we form an iron oxide, which is not the case with burnt lime. H. B. Hubbard, Inland Steel Co., Chicago, favored the use of raw lime, because the boil proceeding from it gives an avenue for the escape of impurities coming up through the bath. This is particularly true of the silicates. Several other speakers agreed with the opinions thus expressed.

C. W. Veach stated that the Scullin Steel Co. uses burnt lime in making castings. Scrap is charged with pig iron placed on top. This is then melted down to a liquid, when the lime is added on top. He reported that this practice considerably increases the production. Samuel B. Muir reported trying burnt lime on top of the charge, without finding much difference.

James W. Mills, National Enameling & Stamping Co., Granite City, Ill., uses burnt lime because of the large spread ($7 a ton) between pig iron and scrap. He reported saving 5 per cent of the pig iron charge by using the burnt lime, and a further gain of an hour in making the heat. He does not believe the quality of the steel is quite as good as with limestone, as the lime boil has a beneficial effect. In charging he puts in two buggies of light scrap, then the lime, then the rest of the scrap and the pig iron.

In General

SEVERAL topics were left uncovered, partly because of the absence of men peculiarly qualified to discuss them. Top Pouring vs. Bottom Pouring of Ingots was deferred to the next meeting, because it was desired to obtain the experience of Carl W. Peirce of the Mansfield Sheet & Tube Co., who has made a specialty of bottom pouring. A paper on "Rimmed Steel," by Dr. Henry D. Hibbard, was in hand, but was not read, in Doctor Hibbard's absence.

In an informal talk, L. F. Reinartz, the new chairman of the conference, expressed the general satisfaction of the conference at the program adopted by the committee, on the basis of topics without set papers. He paid a deserved compliment to the outgoing chairman, E. A. Whitworth, for his method of conducting the meeting and drawing out expressions of opinion, even from those men who would not perhaps have offered them voluntarily.

One characteristic of this meeting, which has been noted repeatedly at previous meetings, was the seriousness with which most of the members went about the business. They were talking shop at lunch, in the corridors and anywhere else where two or three or more were gathered. It was not merely a case of discussing technical matters in the meeting and then dropping their consideration. Some of the individuals were so keen after detailed information regarding practice of other plants that they actually formed a hindrance to what might have been more rapid progress through the mills which were inspected.

Thursday morning was devoted to a visit to the Lackawanna plant of the Bethlehem Steel Co., where thorough inspection was made of both open-hearth No. 1 and open-hearth No. 2, containing respectively 14 and 10 furnaces. No. 1 plant has been improved in the last two years by the enlargement of the first six furnaces from the original 60 tons to the 100-ton capacity of the remaining eight furnaces. A new stockyard was built, which is regarded as a model, containing six tracks under a long-span and long-run craneway. An inclined track from the scale house carries material to the charging floor.

In the afternoon a visit was made to the Donner Steel Co., where great interest was shown in three furnaces having suspended roofs. Two of these are flat roofs, while the other is an arch roof. All were put in by the Dietrich Arch Co. One of the flat roof furnaces was off for general repairs, after having made 418 heats. It had been left untouched, so that the members of the conference could see it before repairs were started.

New England Foundrymen Air Views on Molding Sands

Molding sands monopolized the attention of the New England Foundrymen's Association at the May meeting held Wednesday evening, May 11, at the Exchange Club, Boston. It was one of the largest attended meetings this year.

R. F. Harrington, metallurgist Hunt-Spiller Mfg. Corporation, Boston, and a past president of the association made the chief address, his subject being "The Application of Clay Bond to Foundry Molding Sand Heaps." Mr. Harrington is also chairman of the committee on conservation and reclamation, American Foundrymen's Association, and was responsible for the presentation to those attending the meeting of the tentative standard grading classifications for foundry sands recently published by the national body.

Through the courtesy of Brown & Sharpe Mfg. Co., Providence, R. I., apparatus for sand testing was exhibited and operated. Walter M. Saunders, Saunders & Franklin, Providence chemists, gave a talk on methods now employed on sand testing. He also is a member of the joint committee on molding sand research, American Foundrymen's Association.

Announcement was made that the committee appointed to handle an apprentice molding contest has completed arrangements and patterns will soon be sent those New England foundries in the association who wish to participate. The contest is fostered by the national association, and will be decided in June, at Chicago. H. S. Chafee, Builders Iron Foundry, Providence, president of the association, presided at the meeting.

Reinforcing Bar Distributers Merge

The American System of Reinforcing, Los Angeles, and the Edward L. Soulé Co., San Francisco, distributers of concrete reinforcing bars, have been merged under the name of the Soulé Steel Co. Personnels of both companies will remain unchanged and offices will be maintained in the Washington Building, Los Angeles, and in the Rialto Building, San Francisco.

Oppose Lower Rates from East

Chicago Mills Object to Changes That Would Permit "Dumping"—Cast Iron Pipe Makers Also Testify

CHICAGO, May 16.—Iron and steel producers, especially those in the Chicago and St. Louis districts, are vigorously defending what they believe to be their natural territory against invasion by Pittsburgh producers, in hearings now being conducted by the Interstate Commerce Commission at the Edgewater Beach Hotel, Chicago, as a part of its general rate inquiry. Commissioner Johnston B. Campbell is in charge of the hearings, which opened on May 12.

Testimony on behalf of the producers by Edward M. Adams, vice-president Inland Steel Co., Chicago, disclosed facts relating to the market situation and regarding the history and production of iron and steel in the Chicago territory. Mr. Adams stated that the Inland Steel Co.'s present ingot capacity is 1,600,000 tons annually, as compared with 140,000 tons in 1902 when his company first started the operation of open-hearth furnaces. He stated that steel production in the Chicago district is adequate to meet the requirements of this territory both as to volume and in great measure also as to diversity of products. He added that the Pittsburgh "Plus" selling basis was not particularly favorable to the development of the iron and steel industry in this district, and that the expansion of production here has been more rapid since the abandonment of that mode of quoting. Rates that allow Eastern producers to come into the Chicago territory, according to Mr. Adams, do not increase the consumption of iron and steel but yield the carriers less revenue for their haul than would be the case if rates were adjusted so that they would not allow "dumping."

Under cross-examination by counsel for producers in the East, he said that Chicago mills now ship north to Canada, east to some points in Michigan and Ohio, southwest to certain points in Oklahoma and northeastern Texas and west to the Rocky Mountains. This, however, is not undisputed territory, he said, as is evidenced by the competition offered by Eastern producers throughout that area.

Implement Makers Ask for Lower Rate

A request for a 13½c. rate between Chicago and Moline, Ill., on plates, shapes, bars and similar material used by the manufacturers of farm machinery was entered by A. R. Ebi, general traffic manager Deere & Co., Moline, Ill. In his testimony Mr. Ebi stated that an analysis of 184 cars of steel shipped by his company from September to December, 1926, inclusive, showed that individual shipments ranged from 36,175 lb. to 145,215 lb., with an average of 74,303 lb. per car. Over 42 per cent of these shipments were in excess of 80,000 lb. per car. He pointed out that the minimum loading attached to the existing rate of 17c. between Chicago and Moline is 36,000 lb., and he suggested a minimum of 80,000 lb. with a lower rate. He called attention to the fact that the rate from Chicago to Mount Vernon, Ill., is 18½c. and that the distance is 67½ per cent farther than the 164 miles between Chicago and Moline.

Comparison was made between the 17c. rate to Moline and the 15½c. rate now allowed on "car materials" to Bettendorf, Iowa, a point 12 miles beyond Moline. "Car materials," he contended, consist of the same products that are used by the farm implement manufacturers at Moline. The annual tonnage consumed by the Tri-Cities was said to be 500,000 tons, and on that basis the rate should be 13½c. with an 80,000-lb. minimum, according to Mr. Ebi, but in any event it should not be more than the 15½c. rate that is now applied to Bettendorf. The witness declared that virtually every manufacturer of farm equipment can advantageously ship in 80,000-lb. carloads.

Testimony was given to show that a mileage scale should not be applied to cast iron pipe, a commodity that is moved relatively long distances. H. A. Ribe, traffic manager McWane Cast Iron Pipe Co., Birmingham, also representative for other Southern and Eastern pipe producers and for the Alabama Steel Shippers' Conference, stated that 60 per cent of the total production of cast iron pipe is in the South, 27 per cent in the East, including Virginia, and 13 per cent in Central Freight Association territory. He contended that cast iron pipe should be excluded from any revision of iron and steel rates for the reason that the tariff applicable to it is in no way associated with those applying to iron and steel. He further pointed out that the consumers of cast iron pipe are almost exclusively municipalities and that they should not be burdened with higher prices that would result from an advance in freight rates. Changes in Official Classification territory, he said, would of necessity result in changes in the rate structure in Southern Classification territory.

Denies Passing of Pittsburgh "Plus" Has Reduced Competition

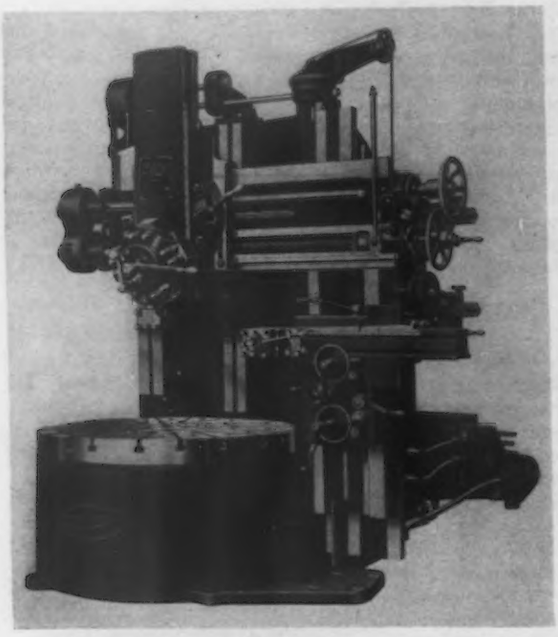
The second day of the hearing, May 13, was devoted almost wholly to the complaints in Docket 18,688. The first witness, H. S. Schroeder, vice-president Interstate Iron & Steel Co., Chicago, touched principally on market conditions in this territory and the history of his company and other producers in the Chicago district. The present capacity of the Interstate Iron & Steel Co. was placed at approximately 420,000 tons a year, whereas in 1916 it was 180,000 tons. Approximately 50 per cent of the increase, said Mr. Schroeder, represented tonnage new to the Chicago district, the rest having been acquired through the purchase of plants. In cross-examination he said that in its initial phases Pittsburgh "Plus" had been advantageous to Chicago producers, but in his opinion its abandonment had not hurt them. Counsel for the Jones & Laughlin Steel Corporation, Pittsburgh, sought to obtain from the witness a statement that competition from the East in common territory has been less keen since the abandonment of Pittsburgh "Plus." Mr. Schroeder declared, however, that it was sharper now than it had been previous to 1920, and that any gains by the Chicago district since that time were due primarily to economic changes, such as the shifting of population and natural advantages which have stimulated the development of this district. Commissioner Campbell then asked the witness if, since the abolition of Pittsburgh "Plus," there had developed a Chicago "Plus" basis whereby a customer was charged a freight rate in excess of that which was paid the railroad. Mr. Schroeder replied in the negative. Commissioner Campbell took the attitude that if it should be found that purchasers of iron and steel were paying freight charges in excess of the amount actually paid to the railroads for transportation the commission would try to see to it that such sums were turned over to the carriers.

Robert Hula, traffic manager Clayton Mark & Co., Chicago, testified in behalf of the Illinois-Indiana shippers' steering committee in defense of present groupings and adjustments in those two States. He said that he did not intend to defend any particular feature, but that his interest was in the preservation of the arrangements under which the industry has developed. Mr. Hula favors the establishment of rates from Chicago eastward on the same scale prescribed in the Jones & Laughlin case from points in the East to destinations in the West. He attributed the decline in the volume of iron and steel coming into the Chicago territory from Pittsburgh and other Eastern points partly to the lowering of prices by local producers following the abolition of Pittsburgh "Plus." He introduced an exhibit comparing the rate from Chicago with those from Eastern producing points to a number of representative market points, to show that Chicago was paying full fifth-class rates against 50 per cent to 90 per cent of fifth-class rates from the competitive points.

Adds 64-in. Machine to Line of "Spiral-Drive" Type Vertical Turret Lathes

The Bullard Machine Tool Co., Bridgeport, Conn., has added to its line of "spiral-drive" type vertical turret lathes the 64-in. machine shown in the accompanying illustration.

An outstanding feature of this new series of machines, announcement of which was made in THE IRON AGE of Jan. 27, is the use of a spiral bevel table drive gear and pinion. In this construction, a spiral bevel gear of large diameter is built into the underside



Spiral Bevel Gear Table Drive and Ten-Point Turret Locking Devices Are Features

of the table and driven by a pinion which is mounted on the main driving shaft and supported by inner and outer bearings. This type of drive is claimed to assure especially smooth action and to provide a more constant transmission of torque with greater strength for proportional tooth size. Other features include the all-steel main slide and turret, and the ten-point turret locking device.

The capacity of the machine is for work 66 in. in diameter and 33¾ in. in height under the cross rail. The maximum distance from the table to the turret face is 48 in. The table is 61 in. in diameter. Twelve table speeds, ranging from 2.5 to 43 r.p.m. are obtainable through two systems of selective sliding gears and positive clutches. Control levers are positively interlocking, and all operating levers and handles are located within easy reach of the operator.

There is one vertical head and one side head, as heretofore, but in this design the main-turret slide and side head slide are of cast steel. The center stop provided for the main head is arranged to permit the head to be carried beyond the center 6 in. The vertical head will face 66 in. and has a vertical movement of 27 in. The side head has vertical movement of 29 in. and horizontal movement of 24 in. The side head does not swivel.

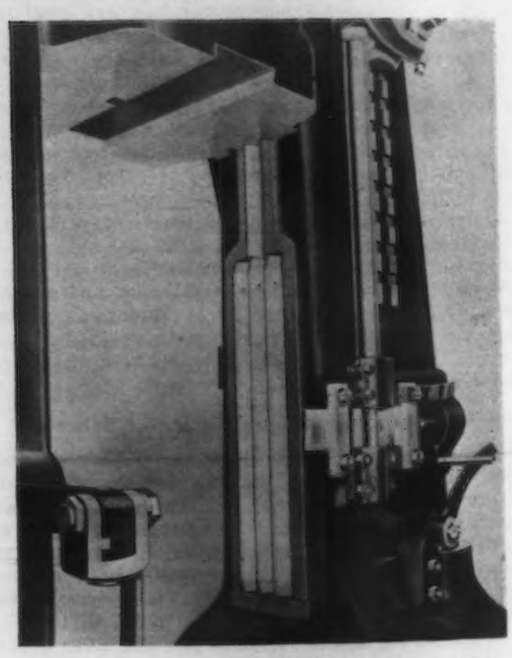
Hardened steel gears are used throughout, the alloy steel for the gears being selected to meet the various service requirements. Shafts are also of alloy steel and heat treated. Lubrication has been given thorough attention. Alemite-Zerk pressure oil gun lubrication is employed for all bearings in external units not having a fixed relation to the bed, and which, therefore, are not reached by oil from the constant flow system or other unit reservoirs.

A thread cutting attachment is available and also forming attachments of either plate or universal type. The forming attachment is intended for the machining of crowns, bevels and similar contours with the side head. For motor drive a 15-hp., 900-r.p.m. constant-speed motor is employed, the motor being mounted on a bracket at the rear of the machine. The floor space occupied by the machine is 126 x 126 in. and the height, with rail and slide in the highest position, is 129 in. The net weight is 28,000 lb.

Patent Granted for Drop Hammer Latch

The United States Patent Office has issued to the Erie Foundry Co., Erie, Pa., a patent covering the latch mechanism used on the company's board drop hammers for the past five years, during which time the patent application has been pending.

This mechanism, applied to a board drop hammer having box section frames and inserted guides, is shown in the accompanying illustration. The function of the latch is to support the friction bar in its upper position, thus holding the rolls of the hammer disengaged from the board, except when the ram is being lifted. It also serves to release the friction bar, permitting the bar to drop and engage the rolls at the proper instant, as the ram drops and approaches the bottom of the stroke. It is claimed that the mechanism eliminates bending and twisting strains on the friction bar, thus prolonging the life of that part. Increased latching areas and the incorporation of hardened tool steel wearing edges are stressed as markedly reducing the cost of maintenance of the latch itself. All parts of the new



Elimination of Bending and Twisting Strains on the Friction Bar Is Claimed for the Recently Patented Latch

latch are supported in grooves or on shoulders planed from the solid metal of the frame, so that none of the bolts are in shear. Through bolts, rather than studs, are used throughout.

Sharp Decrease in Mechanical Stokers

April sales of mechanical stokers, as reported to the Department of Commerce by 11 establishments, amounted to 77 units of a total of 26,249 hp. This is the smallest rating in considerably more than two years. It compares with 49,694 hp. in March and with 70,055 hp. a year ago. It happens that the stokers to be installed under firetube boilers in April made the largest total since last October, and, with two exceptions, the largest since May, 1926. The sharp decrease came in stokers for watertube boilers, which amounted to only 22,475 hp., or less than half the March total.

84-IN. TRAVELING-HEAD PLANER

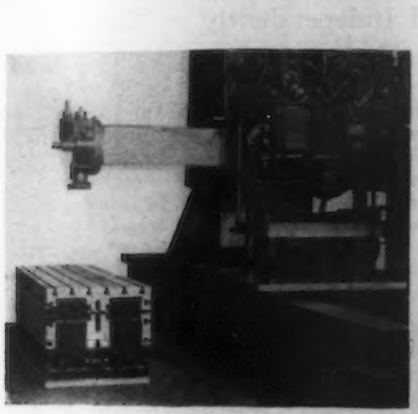
Large Unit Equipped to Permit Machining of Heavy Castings at One Set-up

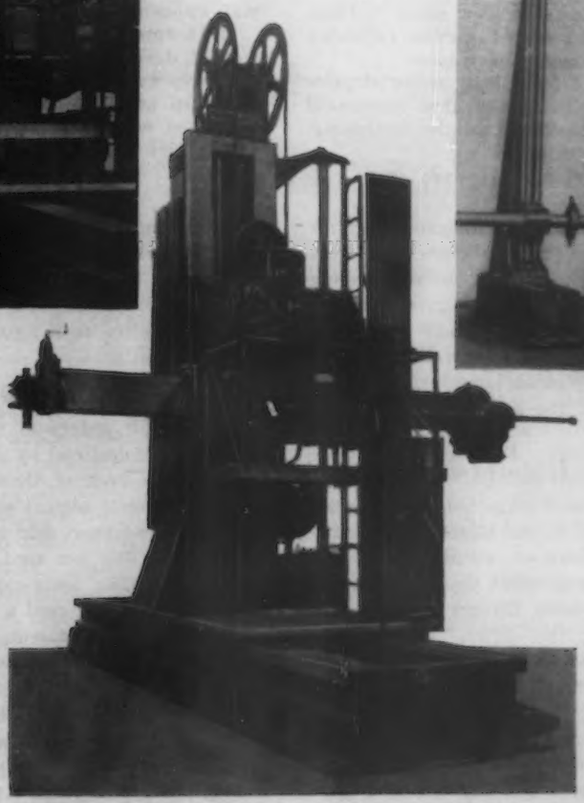
PLANING, boring, milling and slotting operations on 222,000-lb. cast-steel rolling mill housings on a production basis is claimed for the 84-in. stroke draw-cut traveling-head planer here pictured, which has been added to the line of the Morton Mfg. Co., Muskegon Heights, Mich. The machine is adapted also for the complete machining of engine beds, air compressor, refrigeration, and turbine castings. It may be employed for the keyseating of large flywheels and gears, and for a variety of heavy-duty repair work.

Floor plates, work tables, a milling attachment, a right-angle boring attachment, standard and traveling-head boring bars with an outer support for the bars, a reversible head for either push or pull cuts, push- or pull-cut slotter bars, and special equipment are available for use with the machine.

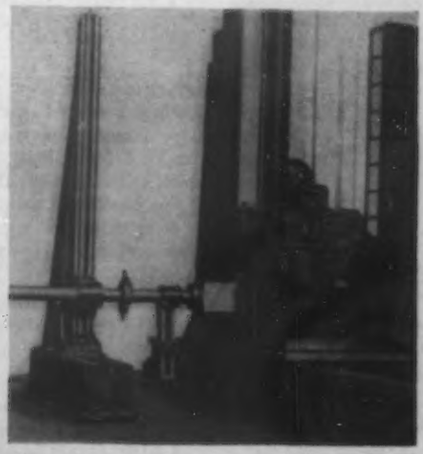
Machines of this design are also regularly built in 60-in and 72-in. sizes and with various heights of column and lengths of bed. Planers larger than the 84-in. machine can be built for special work. Savings in floor space and power are advantages claimed for this type of planer as compared to housed-planers of equal capacity.

The machine is arranged either for stationary or portable use, the bed being planed on the bottom. It is reversible and may be changed quickly into a traveling-head slotter. Milling and boring feeds may be changed quickly to meet conditions. The machine will mill vertically and bore at right angles with the ram at any 90-deg. point of an arc. Many operations may be accomplished in one setting of the work, which results in a large saving of time. Control levers are centralized and are located within easy reach of the operator.





The Machine May Be Arranged With Boring Bar, Outer Bearing Support, Cutter Head and Facing Arm, as Shown Above



The View Above Shows the Arrangement for Vertical Milling Operations. Milling and boring feeds may be quickly changed

Accelerated Test to Show Resistance of Metals to Corrosion

The United States Bureau of Standards is interested in the development of an accelerated test to determine the resistance of metals to corrosion, and believes that this may exist in the voltage required to cause the metal to corrode at a definite rate.

It is now generally agreed that the corrosion of metals, at least when immersed in liquids, is an electrolytic process. This means that a current flows through the solution between the part of the metal that is dissolving (i.e., acting as an anode), and some other part which serves as a cathode and is not attacked. Such corrosion may be due to differences in the purity or physical condition of the metal at different parts, or to differences in the composition of the solution adjacent to different parts of the metal.

In order to determine the relative corrosion resistance of various metals, accelerated tests are often employed. Among these are electrolytic tests in which corrosion is hastened by the passage of a current. Among such methods the one most frequently used has depended on the loss in weight that occurs when the current passes for a given time. The present investigation has shown that these results do not give a satisfactory indication of the natural tendencies of the metals to corrode.

By measuring the potential or voltage required to cause the metal to corrode at a certain rate, a better indication of the resistance of the metals to corrosion is obtained. Further work will be required, however, to determine whether such an accelerated test can be depended upon to indicate the probable life of any metal under any given conditions of actual service.

"Occurrence, Distribution and Significance of Alkali Cyanides in the Iron Blast Furnace" is the title of technical paper 390 by S. P. Kinney, supervisor of ferrous metallurgy, United States Bureau of Mines, and E. W. Guernsey, associate chemical engineer, Fixed Nitrogen Research Laboratory, Department of Agriculture, Washington. The pamphlet contains 37 pages and is well illustrated with photographs and drawings

Business Analysis and Forecast

BY DR. LEWIS H. HANEY

DIRECTOR, NEW YORK UNIVERSITY BUREAU OF BUSINESS RESEARCH

Current Statistical Data, Considered Independently of Trade Opinion, Indicate That:

STEEL production continues above normal, April showing a slight decline following three successive monthly increases.

Finished steel, after a long period of price stability, appears weak, the slow downward movement of the past four months continuing, in conformity with other prices.

Pig iron production, still heavily above normal, appeared clearly excessive in April.

It seems likely that the firmer pig iron market, developed as forecast two months ago, may give way to lower levels.

Scrap and billet prices are a little high, compared with important finished items, but billets are low in comparison with raw materials.

WHILE our analysis last week indicated that the *potential* demand and the supply are in fair adjustment with relation to steel, the outstanding fact is that at present the actual buying of iron and steel is backward. This condition appears sufficiently pronounced to require a further downward readjustment in production, and may mean lower prices during the next few months, until the readjustment is completed.

Steel Position Unfavorable

OUR first chart shows that steel prices are sagging, that production is above normal and tending downward, and that unfilled orders are about steady on a very low level. Thus the statistical position is somewhat unfavorable and suggests further weakness in price.

The April ingot output of 4,130,000 tons was at an annual rate of 111.2 per cent of normal requirements. In other words, it was 11 per cent above "normal." This allows for a small, steady growth over a period of years and for the fact that April is usually nearly 9 per cent under March. It may be estimated that the normal ingot production in April would have been about 3,712,000 tons.

Last year in April there was not so much of a decline from March as has just occurred, and the following months showed hardly more than a bare seasonal decline. The true high point of the year, considering seasonal conditions, was reached in August. This year the April decline has been more like that of early 1925, and seems likely to carry ingot output considerably lower by July. In our opinion, the total output is likely to decline to a figure not over 3,100,000 tons by July or August.

Seasonal Decline in Unfilled Orders

UNFILLED orders of the United States Steel Corporation declined by about 97,000 tons. While this decline was greater than outsiders had expected, it really represents almost exactly the usual seasonal percentage of decrease, and our adjusted index of unfilled orders was 70.2 per cent of the average for the six years 1921-1926. This compares with 69.5 per cent in March and 76.6 per cent a year ago. Thus really there was a slight improvement, reflecting the fact of prompt reduction of output as orders decline. It indicates that the industry has itself pretty well in hand.

But the smallness of the backlog many will take to mean less ability to take a firm attitude on prices. In fact, THE IRON AGE composite price of finished steel averaged only 2.356c. in April, against 2.367c. in March (and 2.439c. a year ago). This is the lowest point reached by THE IRON AGE composite since August, 1922. The recent advance in sheets was justified by cost of production, but it remains to be seen whether it will apply on any important business. On the whole, it looks as though the average of finished steel prices will

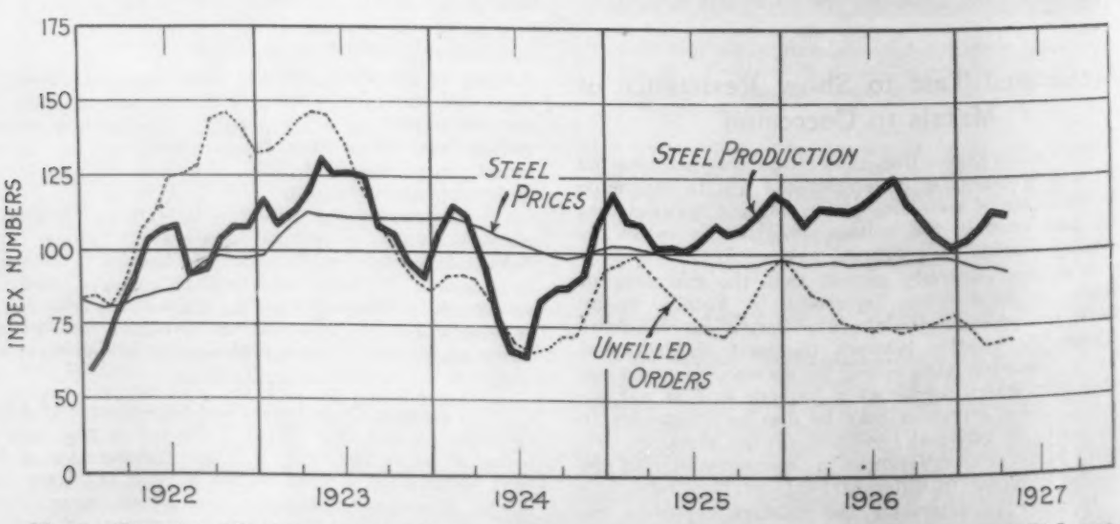


Fig. 1—Tapering Off of Ingot Production, After Rises in Each Month of the First Quarter, Still Leaves Ingots 11 Per Cent Above "Normal." Unfilled orders declined less than is usual for April. Prices of finished steel have been sagging since December, after a long period of relative stability

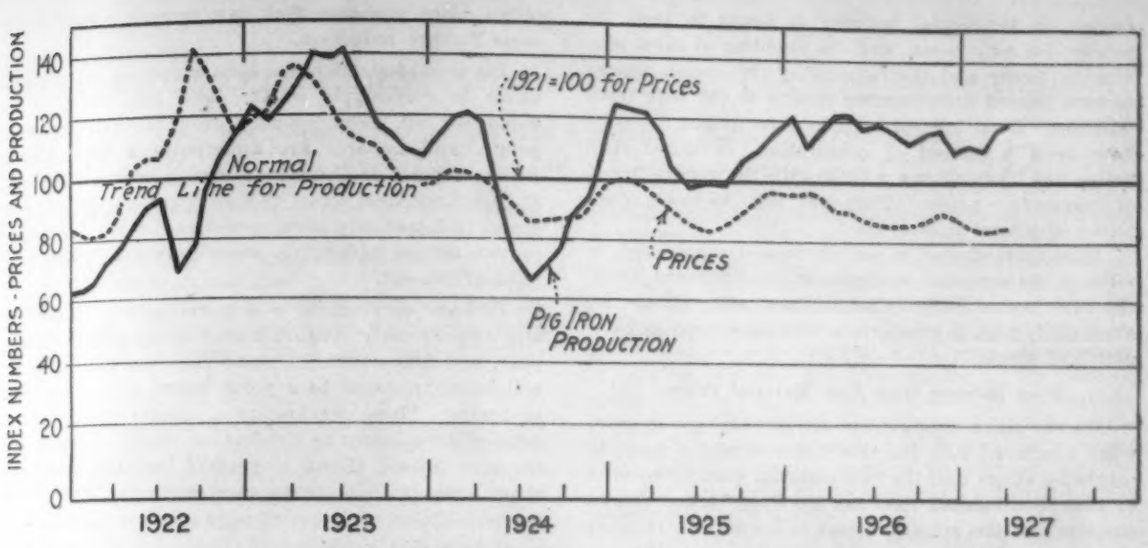


Fig. 2—Pig Iron Production Continues High in Relation to Steel, and Was Clearly Excessive in April. From this unfavorable symptom, a large decline is likely before long. The price is the lowest, for the season, since 1922, and probably will sag lower

go a little lower before any material advance can be sustained.

Excessive Pig Iron Output

PRODUCTION of pig iron appears to have been clearly excessive in April. Judged by any reasonable statistical test, it was well above the long-time trend of the nation's requirements. Our own adjusted index for the month was 119.4, comparing with 117.1 in March and with 121.8 in April, 1926. This amounts to saying that we estimate that pig iron production was only a little less than 20 per cent in excess of normal requirements. As a rule, when a point as high as this is reached curtailment is required in a very few months, the severity of the reduction depending partly on the extent to which 120 per cent of normal is exceeded. More than this, the output of pig iron is relatively high in comparison with ingot production, which, as we have frequently pointed out, is an unfavorable symptom. Just at present, too, this condition is emphasized by the abundance of scrap, to say nothing of some increase in imports.

Altogether, conditions plainly forecast a considerable curtailment in pig iron production during the next few months. It seems probable that the output will fall to a monthly figure around 2,700,000 tons before the summer is over.

THE IRON AGE composite price of pig iron averaged a little higher in April, thus confirming previous forecasts. The average was $19.19, against $19.04 in March, and $20.52 a year ago. On May 10, however, the average was $19.13 and the market is reported to be weaker. We think the price of pig iron is likely to decline further, due to the high rate of production, weakness in steel prices, lower coke and the abundance of the supply of scrap, which material is rather weak in price, though probably near bottom levels.

Price Structure Needs Adjustment

ON the whole, finished steel prices impress this observer as being fairly weak. It is generally agreed that the demand for bars has fallen off and is running behind production. Some increase in imports of bars is a slight factor. The depressed condition of the oil business has affected unfavorably not only the demand for well material, but also for plates. The continued

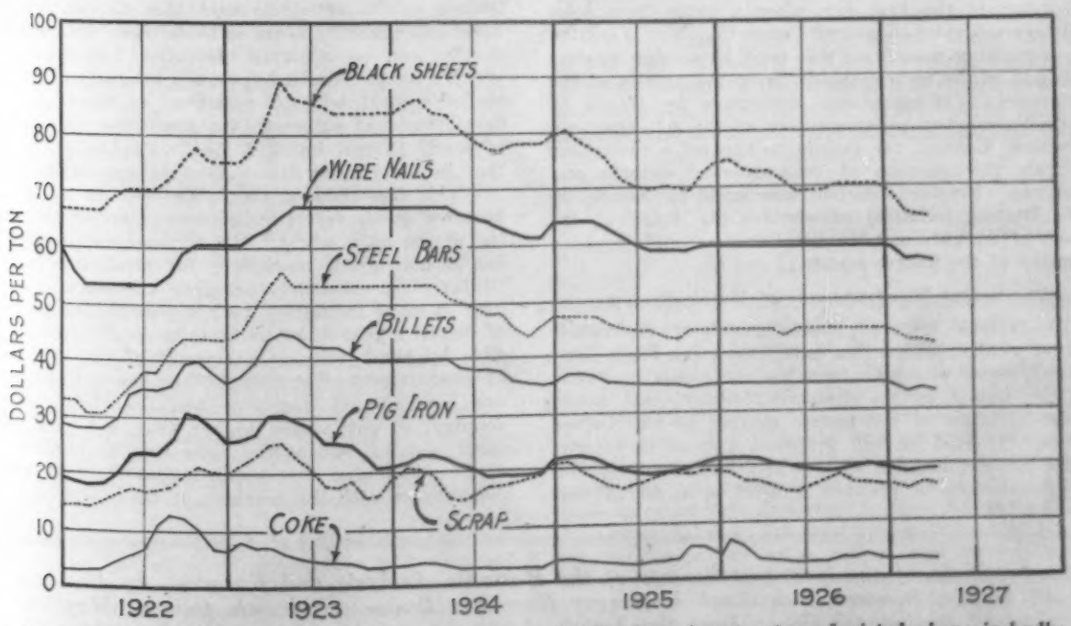


Fig. 3—Finished Steel Prices Are Somewhat Weak. While the price structure depicted above is badly out of adjustment, some portions of it are in accord with each other. The relation of billets to bars and nails may be about normal. So is the spread between pig iron and scrap. But both finished steel and semi-finished are too near the raw material level

decline in residential building is bound to keep the market for nails weak, and the condition of farm purchasing power and the lateness of the season appear to have caused disappointing results in the wire fence business. Even the mark-up in sheet prices seems to have been a counsel of desperation. Finished steel prices are likely to sag a little with the general trend of commodity prices. They are low, however, compared with semi-finished steel.

Semi-finished steel is plainly in over-supply and, in view of the essential weakness in most finished items, the price seems likely to move downward. Billets are abnormally high in comparison with such items as bars, nails and sheets.

Poor Balance With Raw Material Prices

On the other hand, billets are already low in price when compared with the raw material, and it must be concluded either that the raw material must be reduced or that semi-finished steel can hardly go lower. While our study of the price structure indicates that there is no chance of higher finished steel for some time, it seems more probable that raw materials may suffer some further reduction.

Pig iron production has been excessive, and pig iron exists in over-supply at the same time that the demand is dull. The foundry melt is small at most points, and imports are apparently a little larger. Recent reports indicate that coke is now available at $2.75. Even steel scrap, though it can hardly go much lower, will probably show weakness for another month or two before advancing, since buyers are well supplied at present.

Perhaps as reasonable a guess as any is that by late July or early August higher scrap prices will appear, and that about the same time the fuel situation will have developed to a point where coke prices will be firmer. These developments, together with the results of curtailment in production, would bring higher pig iron prices. Then, if general business conditions show signs of the autumn recovery, which now seems not improbable, steel prices may again be advanced to more profitable levels.

Pan-American Standardization Meeting

Conference Agitates Metric Question—Simplification Tied In With Low Ultimate Costs

WASHINGTON, May 16.—Despite opposition, the Second Pan-American Standardization Conference closed a two-day meeting here on Wednesday of last week by adopting a resolution recommending "to the principal associations of manufacturers and exporters in the United States the great advantage which would result from their agreement in the shortest time possible to adopt gradually the decimal metric system in their exporting to Latin America, beginning by indicating the equivalent metric decimal in their bills of lading and shipping documents, together with the corresponding American system, and gradually adopting containers and units agreeing absolutely with the metric system in their exportations to the above mentioned countries, in all cases in which this may be possible, and also agreeing that the exporters in Latin America indicate their shipments in units which may be in accord with the metric decimal system. And that they approach as much as possible the systems now used, but avoiding in all cases fractions."

The metric system had been the subject of a lively discussion on the first day, when a letter from John B. Berryman, vice-president Crane Co., New York, to the organizing committee was read, protesting against exclusion of the metric system from the agenda of the conference. Criticism also was made by Henry C. Link, Washington representative of the All-American Standards Council, for failure to appoint a committee to study the question of unification of weights and measures. Similar criticism was made by Samuel S. Dale, Boston, technical adviser for the American Institute of Weights and Measures, who strongly opposed adoption of the metric system.

Points Out Disadvantages of Metric System

He declared that any investigation of the metric system would convince the Inter-American High Commission, under whose auspices the conference was held, and the public, of the disastrous results that would follow adoption of the metric system by the United States. He said he had prepared a brief in support of the present English system and invited metric system proponents to prepare a brief in favor of that system. Adoption of the resolution favoring use of the metric system in connection with exports clearly was the result of agitation by its proponents, who apparently consider that this plan would be an approach to general adoption of the system.

Other resolutions of the conference recommended the establishment of a permanent committee in the Inter-American High Commission to propagate the standardization of raw materials. The next conference was set for Cuba in 1930. The final sessions were held at the Bureau of Standards, where a luncheon was given the conference by Dr. George K. Burgess, director of the bureau.

Standardization Begets Mass Production

C. E. Skinner, chairman of the American Engineering Standards Committee, addressed the conference on the subject of advantages of standardization and simplification to consumers as well as to producers. Referring to the results of simplification and standardization as they permit mass production and straight-line loading in factories, he said that the experience of American manufacturers is that, when such mass production can be achieved, facilities and special tools which may be required for such production can be installed almost without reference to their cost. The development of automatic machinery for the production of many things, he said, has undoubtedly gone further in the United States than in any other country.

"This has reduced the labor cost on many manufactured goods to an insignificant part of the cost of the device as a whole," Mr. Skinner continued. "The use of high-grade machinery for production, and particularly the extremely accurate automatic machinery used in many industries, makes possible the production of better goods, more uniform in quality than is possible by hand labor. On account of the vast volume of goods produced by this method, we are still able to find employment for our workers throughout the country, to pay wages higher than are paid in any other country, and at the same time to produce high-grade goods at a cost which makes them available in competition with the markets of the world."

Schedule of the next installments of the ***Business Analysis and Forecast****, by Dr. Lewis H. Haney, Director, New York University Bureau of Business Research, follows: May 26—General Business Outlook; June 9—Activity in Steel Consuming Industries; June 16—Position of Iron and Steel Producers.*

Notable Development in Magnetic Testing Revealed

New York Steel Treaters Learn of a Practical Method of Determining Magnetically Certain Properties of Steel

THE first public announcement of a new development in magnetic testing of steel was the feature of the last monthly meeting for the year of the New York chapter of the American Society for Steel Treating, Monday evening, May 16. The attendance was the largest in the eight years' history of the chapter, there being close to 300 metallurgists and other scientists present.

The address of the evening was delivered by A. V. de Forest, research engineer, American Chain Co., Bridgeport, Conn., who took as his subject "Magnetics and the Structure of Steel." Mr. de Forest is one of the leaders in magnetic research in this country and his address was listened to with unusual attention. He described a new form of oscillograph for magnetic inspection. This instrument traces on a screen a closed stationary pattern in which the particular magnetic character of any material under test can be easily distinguished. One of the coordinates of the plot is given by the harmonic variations in the alternating current used for the test, while the other coordinate represents the difference between the hysteresis loops of the specimen and a standard. From the resulting diagram, the effects of composition, heat treatment or deformation can be studied.

A motion picture camera was used to photograph these diagrams and their changes, and a film showing these was run off during the lecture. The formation and adjustment of the figure was described and the change produced by external stress was demonstrated. A change in magnetic properties was shown to correspond to the elastic limit; the various phenomena of mechanical hysteresis are shown to have their counterpart in the stress-magnetic curves.

The same apparatus is also used to show the effects of composition and heat treatment of small forgings. A moving picture, also reproduced at the lecture, shows the mechanical tests applied and the various magnetic patterns which result from commercial operations. This method is shown to be applicable where many variables, such as composition, forging temperature and the results of quenching and drawing have to be estimated at a glance.

Numerous questions were answered by Mr. de Forest and he concluded with a brief outline of possibilities of this method of test at determining the effect of fatigue as developing defects not only in test pieces themselves but upon actual material in operation, such as car wheels, etc. The address was enthusiastically received and a cordial vote of thanks was unanimously accorded him. It is understood that the subject will be gone into more in detail at the annual convention of the American Society for Testing Materials at French Lick, Ind., during the week of June 20.

The new officers of the chapter were announced as duly elected, each one having received 168 ballots, and they were installed in office. A list of these was published in THE IRON AGE, May 12.

New Extras on Stripsheets Announced

A revision of the card of extras on cold-rolled strips has been necessary to accommodate the new product, stripsheets, in cold-rolled finish. The base price recently established of 3.25c., f.o.b. Pittsburgh and Cleveland, for lots of 1 to 3 tons, with deductions for quantity producing a price of 3c. for lots of 18 tons or more of one size and temper for one shipment, now applies on the widths up to 12 in. That width and wider is now offered as cold-rolled stripsheets and takes a base of 3c., Pittsburgh or Cleveland, subject to the following extras; applicable to coils or cut lengths:

Extras Per 100 Lb. (0.20 Per Cent Carbon and Under) to Be Added to Base Price

Grade	Thickness	Extra
B	0.1158 in. and heavier	$0.35
A	0.1158 in. and heavier	1.20
AA	0.1158 in. and heavier	1.45
B	0.114 to 0.075 in.	0.45
A	0.114 to 0.075 in.	1.30
AA	0.114 to 0.075 in.	1.55
B	0.074 to 0.055 in.	0.55
A	0.074 to 0.055 in.	1.35
AA	0.074 to 0.055 in.	1.60
B	0.054 to 0.035 in.	0.80
A	0.054 to 0.035 in.	1.50
AA	0.054 to 0.035 in.	1.75
AA	0.034 to 0.028 in.	1.90

The above extras include oiling and when added to base prices will give net prices for various grades when forming only, or very simple or shallow drawing is to be done. These extras cover all tempers except those required for deep drawing work.

A deep drawing extra of 25c. per 100 lb. is to be added when steel is required to meet medium drawing requirements.

An extra deep drawing extra of 50c. per 100 lb. is to be added when steel is required to meet severe drawing requirements.

A trimming extra (resquaring) of 5 per cent is to be added to the total price if a mill edge of commercial width accuracy is not sufficient.

A special flatness extra of 25c. per 100 lb. is to be added if extreme flatness is required. This corresponds to patent leveling.

"B" grade is comparable with full-finished full cold-rolled sheets; "A" grade is comparable with standard automobile body sheets, and "AA" grade is comparable with full-finished automobile body crown, fender and cowl sheets. Stripsheets are frankly offered as a competitive product and the new extras are modeled after those on sheets.

Bookings of Fabricated Structural Steel

WASHINGTON, May 17.—Fabricated structural steel bookings in April aggregated 207,646 tons, or 76 per cent of the monthly capacity of 275,115 tons represented by the 188 reporting firms, according to the Department of Commerce. March bookings of 203 reporting firms amounted to 184,314 tons, or 65 per cent of their capacity of 283,170 tons. Computed bookings in April totaled 241,680 tons, against 206,700 tons in March, while April shipments were computed at 209,880 tons, or 66 per cent of capacity, compared with 200,340 tons, or 63 per cent of capacity, in March.

Computed bookings for the four months of 1927 amounted to 839,520 tons, or 66 per cent of capacity, against 801,360 tons, or 63 per cent of capacity, for the corresponding period of 1926, and 804,410 tons, or 64 per cent of capacity, for the corresponding months of 1925. Computed shipments for the three respective periods were: 766,380 tons or 60 per cent of capacity; 887,220 tons or 70 per cent of capacity, and 824,190 tons or 66 per cent of capacity.

To Hold Hearing on New England Steel Rates June 15

WASHINGTON, May 17.—The Interstate Commerce Commission yesterday issued an order setting June 15 as the date for a hearing at the Marlborough Blenheim Hotel, Atlantic City, on the proposal of railroads to cancel present commodity rates on iron and steel in carloads and applying the fifth-class rates in New England. At the same time it issued another order suspending until Dec. 16 schedules filed by the railroads which would cancel the present commodity rates and apply fourth-class rates on iron and steel in New England in less-than-carload lots. The hearing on the schedules concerning the carload rates will be held before Commissioner Campbell and Examiners Faul and Bardwell. The proposed rates in this case also have been suspended until Dec. 16. No date has been set for hearing the case relating to less-than-carload rates, but it may be conducted simultaneously with that on carload rates.

CONTENTS

May 19, 1927

Bumpers Put on Production Basis 1427

Tandem Mill for Wide, Thin Plates 1431

Continuous Rolling of Sheets 1435

Training of Owners' Sons 1440

"Get a Profit," Says Foundry Leader 1441

Powdered Coal and Gas Cleaning 1443

Live Topics in British Institute Program 1447

Machine Builders' Jubilee Meeting 1449

Gear Standards Carried Forward 1465

Principles of Boiler Scale Formation....1430
Acquires Interest in Hamilton Furnace..1434
Manganese Ore Discovered in Colorado.1434
New Officers of Testing Society.....1442
Acquires Pittsburgh Transformer Co...1446
Open-Hearth Furnace Discussion.....1451
Oppose Lower Rates from East.....1453
Accelerated Test to Show Resistance of Metal to Corrosion.....1455
Pan-American Standardization Meeting.1458
New England Steel Rate Hearings.....1459
Magnetic Testing Developments.....1459
New Extras on Stripsheets.....1459
Zinc Export Association Formed.....1467
Will Probe Sales Below Cost.....1467
Pig Iron Rate Advances Disallowed.....1484
Cold-Rolled Strip Makers Organize....1488
Miller Medal of Welding Society.....1488
Aluminum Made from Clay.....1488
Quotas an Obstacle in Semi-Finished Cartel 1500
German Export Credit Insurance Claimed Unsatisfactory 1500
Industrial Finances 1508

STATISICAL

Decrease in Mechanical Stokers.....1454
Bookings of Fabricated Structural Steel.1459
British Iron and Steel Output in April..1490
British Trade Declines.....1500
French Exports of Pig Iron and Steel in March 1500

NEW EQUIPMENT

"Spiral Drive" Vertical Turret Lathe..1454
Patent Granted for Drop Hammer Latch 1454
84-In. Traveling-Head Planer.....1455

MEETINGS

Iron and Steel Institute (British).....1447
National Machine Tool Builders' Association 1449
Open-Hearth Semi-Annual Conference..1451
New England Foundrymen's Association 1452
American Gear Manufacturers' Association 1465
National Association of Cost Accountants 1467
International Foundry Congresses.....1488

DEPARTMENTS

Business Analysis and Forecast.....1456
Editorial 1462
Iron and Steel Markets.....1468
Comparison of Prices.....1469
Prices, Raw and Finished Products.1471-1473
Structural Awards and Projects.....1485
Non-Ferrous Metals.....1486
Railroad Equipment Buying.....1487
Reinforcing Steel Business.....1487
Personals 1489
Obituary 1490
European Steel Markets.....1498
Machinery Markets 1501

This Issue in Brief

Father is often a poor instructor of his son who is learning the business. To show his lack of favoritism, he is sometimes over-exacting. Again, he sometimes errs on the side of soft-heartedness, and permits the boy to gloss over necessary parts of his training.—Page 1440.

Charge the "fussy" buyer a higher price. The customer who demands a product higher than a good commercial quality should be made to pay for it. Otherwise the producer loses money.—Page 1442.

Reduces fuel consumption in annealing furnace conveyor by using non-cooled rolls. A heat-resisting alloy, designed to operate in a temperature of 1900 deg. Fahr., avoids the loss of heat by water-cooling.—Page 1434.

Believes finished steel price average will go a little lower before any material advance can be sustained. Dr. Haney believes steel production is above normal. This, coupled with small backlogs, may prevent a firm attitude on prices.—Page 1456.

Cleans gas by electrical precipitation process. This permits the blast furnace gas to retain its sensible heat, conserving fuel. The gas is passed through tubes in which small wires are suspended. A high-voltage current is applied to the wires, and the particles of dust pick up a charge, causing them to adhere to the walls of the tubes.—Page 1444.

Stockholders are entitled to 15 per cent annual dividends in a competitive business, says head of machine tool builders' association. Bases the figure on a study of all business risks. He calculates that the average machine tool builder should earn a total annual profit of 30 per cent to be in an economically sound position.—Page 1495.

Yield of 90 per cent from open-hearth charge is "mighty good." Superintendents report yields from 84 to 92¼ per cent. In calculating weight of charge, one open-hearth man takes scrap, pig iron and ferroalloys at full weight and ore at 60 per cent.—Page 1451.

Price-cutting for capacity business is hurting the foundry industry. Aggregate demand will sustain only a 60 per cent operating rate. The foundry that attempts to get more than its share of business by slashing prices is hurting the whole industry, including itself.—Page 1441.

Speeds production of automobile bumpers by riveting instead of bolting. Assembling is done two and one-half times faster, and output is increased 40 per cent, with no additional floor space.—Page 1427.

Rolling mill power consumption reduced by roller bearings. And accuracy of rolling is increased by equipping backing-up rollnecks with anti-friction in place of bronze bearings. Elimination of heat generated by the latter is found to be of marked advantage in controlling the shape of the rolls.—Page 1431.

Excessive pig iron output may cause a further price decline, says Dr. Haney. He estimates that April output was nearly 20 per cent above normal requirements and forecasts a considerable curtailment in production during the next few months.—Page 1457.

Foundries should not base prices on metal cost. Analysis of manufacturing costs in one plant showed that the metal cost was less than one-fifth of the total. The use of this unsound method of quoting often causes customers to expect unreasonably large price reductions from pig iron price declines.—Page 1442.

Limestone or burnt lime in the open-hearth bath? Some favor raw lime, because the boil proceeding from it opens up an avenue for escape of impurities coming up through the bath. Another uses burnt lime because of the saving in the pig iron charge.—Page 1452.

Not aided by passing of Pittsburgh "Plus," says Chicago steel producer. Declares that increase in business is due to natural expansion of demand in the territory served by Chicago producers. Denies existence of Chicago "Plus," and fights move to lower freight rates from the East.—Page 1453.

New rig is said to reduce roll-changing time. In Lukens' new four-high finishing stand, the rolling is done between the two middle rolls, which are supported by two 40-in. diameter backing-up rolls.—Page 1431.

What is the lowest percentage of pig iron that can be charged in making quality steel? For best results, iron charge should be from 41¾ to 50 per cent, though all estimates above 45 per cent are associated with a cold charge. Open-hearth superintendents emphasize the necessity of avoiding the use of ore.—Page 1451.

Hand-to-mouth buying enables steel consumers to make the savings resulting from reduced inventories. But the steel producers are saddled with an additional burden for which they have not been compensated.—Page 1463.

Continuous stripsheet mill produces 20 to 60 times the tonnage of old-style jobbing mill, with same number of employees. New Butler mill is counted on to produce about 35,000 tons of hot-rolled stripsheets per month. Man-handling of product is virtually eliminated.—Page 1435.

ESTABLISHED 1855

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The Revolution in Sheet Rolling

SOME of the revolutionary changes under way in sheet steel rolling already have been discussed in these columns. Elsewhere in this issue are described two examples of what has been going on, and shortly our readers may look for still another. Twelve, and probably more, steel companies are now occupied with some stage of the problem of selecting equipment and mastering the practical difficulties of continuous sheet rolling, and their combined efforts plainly carry a portent for sheet makers who are still dependent on the time-worn methods.

It is the large volume buyer, such as the automobile builder, who has given encouragement to the new pioneering; but the very fact that there remain large numbers of small consumers demanding wide varieties of gage, size and finish will save those outside the new movement from becoming panic stricken. It was partly because the continuous rolling of sheets was then ahead of its time that the Bray attempt of 20 years ago failed commercially. For successful large scale and rapid production, orders must call for material, not only all of one size but in such quantity that, so to speak, the rolling may not be finished almost before it is begun.

Just where the line runs, below which orders may better be executed according to the old practice, will have to be determined by each new mill operator for himself. In the nature of the case, width and thinness are inversely related, for the wider a sheet for a given roll train, the quicker is the limit reached as to thinness of gage.

Three-high and four-high mills have proved of supreme importance in the new processes. Desirable rigidity and control of the active pass have been secured by the backing up of the working rolls. This in turn has tended to set up high pressures in the bearings of the roll necks, compelling a resort to roller bearings. These last have been developed successfully for the special conditions and have served to lighten the burden of roll breakage naturally expected from the new operation.

Further contributing to those processes which are strictly continuous has been the development of large variable speed electric motors, by which each set of rolls in the continuous train must be driven. Nicety of roll speed is particularly essential in the progressive reduction in section and extension in length of such a thin product as sheets. Accumulated experience in rolling strips has naturally been of help, for the production of a continuous sheet is substantially the rolling of an unusually wide strip.

The Columbia Steel Co. installation is broadly typical of one of the continuous processes, and the Lukens plant is illustrative of the use that can be made of the single four-high stand. The latter application, operated reversing and being of unusual width, and taking the roughed plate directly without reheating, obviously offers unusual opportunities for the rapid reduction and finishing of wide thin plates, both on jobbing and so-called production orders.

Consumers, arguing from the history of multiple production processes, may expect the economies of the continuous sheet mill to be passed on to them. But the vicissitudes through which the sheet trade has been passing may well give such expectations pause. It may turn out that sheets have already been sold ex-continuous mill and that the owners of such mills will use them chiefly as retrievers. More than one producer has come to learn that business taken at the recent low dips is worse than no business at all, and there is every indication at the present time that the sheet makers are practically a unit as to the importance of holding to the better prices which are now quoted.

The continuous mills are facing the necessity of getting back as early as possible some of the very heavy expenditure which the new construction represents, so that no very weak tendency should be looked for in their direction. It is when the price spread finally narrows, as measured in terms of sheet bars, that the old type mills will be facing their crucial problem.

It does not take much calculation to realize that only a limited number of single continuous roll trains, each capable of making 150,000 to 300,000 tons per annum, could satisfy the country's needs of 4,500,000 to 4,700,000 tons.

Meanwhile, owners of old mills will need to do no small amount of planning, if they desire still to be numbered among the purveyors of rolled steel.

Good Steel from Poor Pig Iron

SOME pointed suggestions are made by the new president of the Iron and Steel Institute in his address at the annual spring meeting in London, as reported on other pages. Discussing lack of balance in many modern steel plants and the relation of capital expenditure to manufacturing costs, Mr. Harbord says that more is to be gained by supplying the steel department with suitable pig iron than by trying to improve poor iron in the open-hearth. He then cites certain features of American blast furnace practice which to some extent embody these ideas.

One feature of American practice is causing some concern to metallurgists who are studying the difficulties which persist in open-hearth steel—in particular, the large amount of sonims which now and then appear to the detriment of the quality of the steel. They hold that the forcing of blast furnaces is introducing such an abnormal amount of oxides and inclusions that the best open-hearth practice is unable to remove all of this injurious foreign matter. They cite the production by a 500-ton or 600-ton furnace, of 900 to 1000 tons of iron in a day, or even a less amount under forced conditions, or with the use of too much scrap.

While such practice is exceptional, any tendency in that direction has its dangers. Foundry melters are making more complaint of abnormal iron, and the trouble is attributed to crowding of the furnace and to an excess of scrap. Whatever the merits of the controversy, it is true that "haste makes waste" in steel making as in other procedures. A certain balance in operating practice is essential to the production of quality steel on a high-tonnage basis.

Who Saves by Inventory Reduction?

LONG before the trend toward smaller inventories had reached its recent proportions some observers suggested that much of the large supply of investment funds, in the stock market and elsewhere, was money released from inventory. Now the same suggestion is made with greater force.

Coupled with the observation there is some criticism, not of the policy of reducing inventory, but of the practice of investing the funds released in something that may not be so secure and stable. The manufacturer should know what his raw material, the jobber his stock in trade, is worth to him. An inventory is not profitable as an investment. It is insurance if insurance be needed, but it represents loss of interest as well as expense in extra handling of material. It should be, however, a safe investment. An investment in shares may not be safe.

When the buyer ceases to carry an inventory but invests the capital to get a profitable return, and then expects the seller to carry stocks for him or to modify his manufacturing system so as to be able to produce small lots of a given class of goods instead of large lots, an injustice is obviously done. The buyer increases his revenue and decreases the seller's revenue by demanding the same prices yet causing an increase in manufacturing cost.

This thing has been going on in the steel industry, where the condition is a familiar one, while the trend apparently has not been thought out. At any rate nothing is being done about it. The salesmanship and service idea is being pushed. It ought to be pushed; but is it being pushed in the right direction? Obviously not, when it involves releasing the customer's capital for profitable investment and adding to the manufacturer's cost.

Service should be rendered, but service is worth money and something should be paid for it. True salesmanship consists not in merely getting things sold; it involves securing a price commensurate with the circumstances. That the total trade is increased by such service, in small lot shipments, is a fallacy. It is quite true that steel mill products should be pushed into new uses. But who are the buyers who insist upon and secure small lot shipments in greatest measure? Are they the new buyers, makers of new things, or the old, seasoned and experienced buyers? Every mill can answer that question from its own experience.

For a long time, in the latter part of 1925 and throughout last year, it was a common remark in steel selling circles that all competitive resources and twists except that of price cutting were being employed. From the long range view, was that really true? The record of prices as quoted in the open market shows that it was technically true, in one sense; but there was a continuous trend toward smaller and smaller shipments and quicker and quicker manufacture after receipt of order. If the producers broke even on their manufacturing costs, it was because they introduced improvements, entitling them to a compensation which they did not receive. Where during that period steel prices did not decline in cents per pound they did decline relative to the value in service received by the customer.

Has there not been too much satisfaction in the steel trade over the relative steadiness of prices? Competitive prices are not necessarily the most evil form of competition. One sees precisely what he is doing. To extend service without compensation, to modify trade practices to the disadvantage of costs, is insidious and thereby the more dangerous.

Undervaluation of Railroads

IF a man owned a row of ten houses built as an investment in 1914 at a cost of $12,000 each, renting for $1,200 a year and netting him 6 per cent on the initial cost, he has certainly not continued to rent at such a figure during the thirteen years since elapsed. On the contrary he has raised the rent rather frequently, especially since 1917, and during the last two or three years his figure has been in the neighborhood of $2,100. This has not been arbitrary, but has been the result of bargaining. The lessee has assented, either gracefully or grouchily, out of inability to do any better. He has been unable to do any better, owing to the cost of new houses of the same size and character being about twice what it was in 1914 and commanding a rental of about $2,400 per annum. The difference between $2,400 and $2,100 has been that between a new house and an old one, well maintained but not quite so tight and trim as the new one. The landlord has indeed sold some houses of his row at prices about ten times gross annual rental.

We are illustrating from our own observation. Every man of ordinary experience in business has observed substantially likewise. We do not, there-

fore, need to enter upon any argument to make our point or listen to any explanations of quasi-economists that things are really not what they seem. If any of our forms of government—Federal, State or municipal—found it necessary to condemn one or more of these houses, would it claim the right to do so on the basis of value in 1914? Certainly not. Or on the basis of 1914 value plus cost of improvements? Not that either. The courts would not consent to anything but current value, which would be reproduction value less something variable for depreciation; for anything else would be confiscatory and consequently unconstitutional.

Yet that is what many politicians and public service commissioners would like to do with the railroads. The same man whose mind is clear as to the valuation of a house is confused in regard to that of a railroad. Many men are familiar with transactions in houses. Few know anything of buying and selling railroads. There is another great difference in that the earning power of real estate is left free to the law of supply and demand, while that of the railroads, as public utilities, is controlled by the State.

Many of our higher courts, including the Supreme Court, have recently rendered decisions in tune with the simple principles of economics, equity and common sense. The Interstate Commerce Commission, in the St. Louis & O'Fallon case, by a scant majority has ruled otherwise. The reasoning of these commissioners is feeble, as is pointed out in the minority opinions. There is, however, a major defect in the majority of opinions that heretofore has not been remarked.

Taking 18 billion dollars as the value of railroad structures at the middle of 1919, computing elements at 1914 unit prices, the commission, applying the indices of commodity prices, figures that in 1920 the railroads would thereby have been valued at 41.4 billion; in 1921 at 35.1; in 1922 at 28.3, and in 1923 at 31.3. Such wide fluctuations the commission views as academic, preposterous, a *reductio ad absurdum*. The economists of the commission should have advised it against such a sophomoric conclusion. Physical structures are a composite of materials and labor. It is well known that while commodity prices have fluctuated widely since 1920, with a general downward tendency, labor has been rather steadily rising and the cost of building has been rather stationary at a high level. Instead of applying the commodity indices, therefore, the commission should have used what is called the general economic index as the nearest approximation, which figures since 1919 run something like 200-170-170-180-180-183-180.

Two difficulties of the majority of the commission have been inability to visualize valuation of railroad property on the same principles as that of houses and unwillingness to concede to railroad stockholders such immense value as they really possess, with the corollary that they should receive commensurate return upon it, just as does the landlord of houses. Since 1919 the railroad companies have put about five billions of new money into their properties. A valuation of $18 \times 1.8 + 5 = 37.5$ approximately would involve a return to railroad stockholders that in the opinion of the majority of the commission would be grotesque. It seems to think that the people lack the moral courage to face the facts and that no Governmental body should tell them so.

The St. Louis & O'Fallon judgment may reach the Supreme Court in some form and afford it an opportunity to pass upon the railroad position in the same way as it has done already in respect to other public utilities. In the matter of the Los Angeles & Salt Lake valuation the Supreme Court merely said that this issue had not been laid before it.

Apply Quantities to Socialism

WHAT was the "dismal science" of political economy has been livened in recent years by a large accretion of statistical information, and we now see how things actually work instead of depending upon general theory. We have "quantitative economics."

To the discussion of socialism there has not been applied as fully as there should be the new knowledge we have gained of how things actually work. The proponents of socialism, including the renowned George Bernard Shaw, depend upon theoretical considerations, very aptly expressed, but quite lacking in quantitative conceptions.

A general principle worked out for the recent industrial history of the United States is that with variations in conditions from time to time the division of total income ranges from 75 to 85 per cent to labor and 25 to 15 per cent to capital and management. What is this but that the worker, as distinguished from the entrepreneur or capitalist, pays a commission for his job? In considering whether the service is worth the commission paid, compare the present opportunities of the worker with those he would have if there were no organized industry. The opportunities would be so extremely limited that there would be no comparison at all. If it be argued that the man would rather strike out for himself than work under the limitations imposed by industry, apply a little psychoanalysis. After his hours in organized emp'oyment does he show a desire to express himself by "making things" or going out in an automobile? It is idle to say that man naturally wants to shift for himself but is now curbed by "the system."

A contribution which industry has been making in rapidly increasing proportions in recent years is that of mutual adjustment between the man and the job. For that it charges no commission, but it brings about a great increase in productivity. No proposed system carries promise of successful management of the socialistic state along such lines.

The losses that would be encountered, while they cannot be computed, can be imagined. On the other side we are in position to measure what would be saved. The extra expenditures of the rich, about which socialistic propaganda raves, can be estimated with sufficient closeness to show that they are a negligible percentage of the total national income which the present system brings about. Granting that there is a loss, one may well reflect upon the greater losses we are every now and then being told about—of the country losing a billion dollars a year here, a couple of billion dollars there, and so on. Our greatest loss of all is in our retail selling practices. The indolence of buyers at retail involves an enormous expenditure for "service," and with the socialistic state the people would simply demand still more service.

Gear Standards Carried Forward

Manufacturers' Association, in Convention at Jackson, Mich., Adds to Last of Recommended Technical Practices

TECHNICAL standardization was again the dominant, though not exclusive, topic of discussion at the eleventh annual convention of the American Gear Manufacturers' Association, which was held at the Hayes Hotel, Jackson, Mich., May 12, 13, and 14. Reports were received from 11 committees, some of which had more than one item of their programs up for discussion. Ten of these reports were adopted as recommended practice, as noted below. The chairman of the association's general standardization committee is B. F. Waterman, engineer Brown & Sharpe Mfg. Co., Providence.

There were addresses and papers on both technical and general subjects. Labor relations, both as affecting the operation of individual shops, and from the standpoint of broader social considerations, were dealt with by some speakers, one of whom was the Rev. Dr. F. Spence, Jackson, Mich., who spoke at the annual banquet on "Some Needed Emphases in Industrial Relationships."

A feature of the convention was a visit to the University of Michigan at Ann Arbor. Following luncheon at the university, Prof. A. E. White, of the engineering research department, spoke on "The Research Attitude," enumerating briefly some of the large number of investigations made since 1920 at the university. Various departments of the physical laboratory were visited, and the measurement of sound and vibration, used in connection with studies of gear noise, were demonstrated.

The annual banquet, with F. W. Sinram, president Van Dorn & Dutton Co., Cleveland, and honorary president of the society, as toastmaster, was in the nature of a tenth anniversary celebration. Among those making addresses was Victor Beam, patent lawyer, New York, one of the founders of the association.

Six new member companies were elected to membership. These companies and their executive representatives are: Formica Insulation Co., Cincinnati, R. W. Lytle; Springfield Mfg. Co., Springfield, Ohio, W. P. Metz; Charles E. Crofoot Gear Corporation, South Eastern, Mass., C. E. Crofoot; Federal Gear Co., Cleveland, H. L. Stinnard, and Citroen Gear Corporation, Paris, France, André Citroen.

A. A. Ross, General Electric Co., Lynn, Mass., was elected member of the association's executive committee. F. W. Sinram; A. C. Cooke, vice-president Fawcus Machine Co., Pittsburgh; and H. E. Eberhardt, president Newark Gear Cutting Machine Co., Newark, N. J., were reelected members of that committee.

Greater Skill and More Equipment Required

INCREASED skill, knowledge, and equipment required of the gear maker of today, as compared with that of the manufacturers of 15 or 20 years ago, were emphasized by E. J. Frost, president Frost Gear & Forge Co., Jackson, Mich., and president of the A. G. M. A., in his address opening the convention. His title was "Standards and Specialization."

"Chemistry, so far as our craft was concerned, was almost unheard of," he said. "Alloy steels, as we think of them today, were unknown, and the microscope, so far as its revelations went, was an enigma. Today there is an insistence for better steels and other materials used in gears, and both steel mill and heat-treating plant are importuned to exert their best endeavors to furnish a product that will be satisfactory. We have been compelled to establish chemical and physical laboratories and to resort to the use of powerful microscopes to safeguard our customers' interests in the selection of our materials."

The necessity of the installation of expensive pyrometer control systems and electric heat-treating furnaces was mentioned also, as well as the necessity of training men for the tasks at hand.

Improved shop equipment, which in many cases produces better work at greatly increased speeds, and also the possibility of changes in the type of product, were stressed as often playing havoc with inventories, which a short time ago stood as a valuable asset on the ledger of shop machinery, but which now is of problematical worth, although perhaps far from worn out.

"When we come to ponder these things," said Mr. Frost, "we must arrive at the conclusion that, considering the skill, experience, and monetary risk involved, we, an important industry, are not receiving a just return."

Recommends Reduction in Variety of Gear Steels

In speaking of the association's standardization activities, Mr. Frost pointed out that this work ought to be the means of great saving to the members, and also of large economic value to industry in general. "Possibly it may be a saving factor, also, in helping us to maintain a reasonable margin of profit," he said.

Several possible operating economies were briefly touched on, and, in speaking of gear steels, Mr. Frost said: "Unquestionably, industry is slowly coming to realize the waste which comes from attempting to supply gears made from six or eight different alloys of steel, where one would serve the purpose as well. In the interest of manufacturing economy, it might be well for us, and especially for our metallurgical committee, to give this subject careful consideration, having in mind recommending one alloy as being well or best suited to a given purpose." Such action, it was held, would reduce materially the stocks of steel necessary to carry, and, due to greater familiarity, the narrowing of the selection of steel would also tend to improve the quality of heat treating.

Metallurgical and Other Committees Submit Recommendations

STANDARD practice recommendations of eight of the association's standardization sub-committees were discussed and adopted. Progress reports were made by the remaining sub-committees.

Recommended practice for "Forged and Rolled Carbon Steel for Gears" was submitted by the metallurgical committee, of which C. B. Hamilton, Jr., Hamilton Gear & Machine Co., Toronto, Canada, is chairman. This is the joint work of the A. G. M. A. committee and of subcommittee No. 8 of the Sectional Committee on Standardization of Gears. It supersedes a previous recommendation by the A. G. M. A. committee, and the main body of the specification is the same as that of the American Society for Testing Materials. The specification covers steel for gears in three groups, according to heat treatment, as follows: 1—case-hardened gears; 2—unhardened gears, not heat treated after ma-

chining; and 3—hardened and tempered gears.

A rearrangement of the recommended practice for bronze and brass castings for gears was submitted and accepted. This involves merely a change of style and terminology to conform to that used by the A. S. T. M.

Nomenclature for External Spur Gears Submitted

A suggested standard which was received with interest, and concerning one part of which, the symbols employed, there seems to be a difference of opinion, was that of the nomenclature committee. The reading of this report, entitled "Proposed Suggested Standard for Future Design for External Spur Gear Nomenclature," was preceded by the presentation of a paper, "Gearing Nomenclature—Where Does It Lead Us?" by the chairman of the nomenclature committee, D. T. Hamilton, Fellows Gear Shaper Co., Springfield, Vt.

Prior to the development of the present list of sym-

No.	Term	Symbol	Definition	Formula	Illustration
23	Bottom Land		is the surface of the gear between the flanks of adjacent teeth.		Bottom Land; TFL; LD
24	Bore Diameter	BD	is the diameter of the hole in the gear.		Bore Diameter (BD)
30	Circular Thickness	CTh	is the thickness of the tooth on the pitch circle.	$CTh = \frac{CP^{\circ}}{2}$	Circular Thickness (CTh); Pitch Circle
31	Clearance	C	is the radial distance between the top of a tooth and the bottom of the mating tooth space.	$C = \frac{\text{Constant}}{DP}$	Space Bottom Clearance (C); Tooth Top

Suggested Standard for Future Design for External Spur Gear Nomenclature, Submitted at the A. G. M. A. Jackson, Mich., convention. The report comprises a collection of 48 terms, definitions, formulas and illustrations, arranged as shown above. Changes will be made in some of the terms and definitions as a result of suggestions made at the meeting

bols adopted by the committee, study was made of what had previously been done with regard to gearing and other subjects. It was found that only within the last few years has any serious study been given to nomenclature for gearing. The plan of symbolizing adopted as a tentative standard by the association at its last meeting at Briarcliff, N. Y., and reported in THE IRON AGE of Oct. 21, 1926, page 1137, has met with criticism.

This objection was on the ground that, algebraically speaking, the symbols violated all rules and regulations. Another objection was that the list submitted could not be used in mathematics. It was indicated that, unfortunately, those criticizing the plan have not attempted to present something better as a substitute, and that the committee feels that until an improvement over the present plan is suggested, its efforts should be devoted to a continuation of this work. It was further pointed out that, because such a large number of elements and types of gearing have to be covered, a definite plan is necessary, and the present plan enables any engineer to prepare a list of symbols without fear of conflicting.

Difficulties in preparing definitions were dealt with in the paper, which reflected the committee's approach to the subject of nomenclature, by reference to basic principles and the building up of symbols and definitions according to a definite plan. It is expected that the list of symbols will be modified more or less from time to time, in view of changes of practice and advances in engineering.

At the conclusion of his paper, Mr. Hamilton presented a list of some 48 terms, for each of which the symbol, a definition, formula and illustration were given. These covered external spur gears. It is planned to cover the other types of gearing in a similar manner. It is felt that, by arranging the simpler forms first, advantage can be taken of the previous experience in working up the more complex forms of gearing. Discussion of the report revealed appreciation of the magnitude of the committee's task, and also of the great deal of work already done by the committee. Some changes in the terms and definitions were suggested, and will be acted upon by the committee.

General Recommendation for High-Speed Herringbone Gears

A GENERAL recommended practice for high-speed herringbone gears, or herringbone gears operated at speeds in excess of 4000 ft. per min., pitch line velocity, was presented by A. A. Ross, General Electric Co., Lynn, Mass., for the herringbone gear committee. The association has had a recommended practice since 1923, but the earlier recommendation does not conform to present-day practice for speeds above 4000 ft. per min.

A curve showing the maximum tooth load per inch of active face is included, and a supplement to the report gives data on the tooth pressures for the high-speed gears. It is pointed out that allowable tooth pressures are, for the most part, a matter of experience. A table of typical tooth pressures taken from some specific high-speed applications of herringbone gears is given and discussed in the supplement. The report was offered as a line along which to work, pending more extensive information. A few corrections were suggested, in the general discussion, as well as changes in symbols, to agree with A. G. M. A. suggested nomenclature.

Keyway Practice Adopted

The keyway committee, which is headed by R. Zerfey, engineer of the Tool Steel Gear & Pinion Co., Cincinnati, submitted recommended practice for keyways for holes in gears. This standard, which was adopted, differs from that of the A. S. M. E. only in the addition of a 5/16-in. keystock size. Change from square to rectangular keyways takes place at 4 9/16 in., rectangular keys below 4 9/16 in. being listed as "special," for special applications only.

A practice that would, it was thought, be of help to every gear maker was that for Commercial Spur Gearing Backlash Measured on Standard Center Distance with Feeler, submitted by P. L. Tenney, Muncie Products Co., Muncie, Ind., for the spur gear committee. It comprises a table giving actual feeler thicknesses for various sizes of gears, and was presented as a starting point, rather than an inflexible rule, for gears of the sizes specified. It is based on dividing the following constants by the diametrical pitch: Minimum, 0.03; average, 0.04; and maximum, 0.05.

A progress report of the committee's work in compiling tables and charts giving the hp. ratings of pinions of 15 to 18 teeth, running at various speeds, and including the maximum bores for various allowable stresses, was submitted by the spur gear committee. The tables are being compiled with a view to presenting a precise method of selecting gears well proportioned to accepted standards. The method of selection is simple and is devoid of calculations. It is intended not only to permit saving of time, but to preclude possibility of costly mistakes. The method of using the tables is explained in detail in the report.

Standards Relating to Railway Gears Discussed

Two practices were submitted by the committee on gears and pinions, electric railroad, mill and mine, which is headed by W. H. Phillips, R. D. Nuttall Co., Pittsburgh. One was the A. E. R. E. A. proposed standard web holes for railway gears and the other was recommended practice for Tooth Proportions of and Discard Gages for Long and Short Addendum Railway Helical and Spur Gears. Both practices were adopted, the latter report to be changed in some details relating to the discard gages. W. G. Fisher, General Electric Co., West Lynn, Mass., presented the reports, in Mr. Phillips's absence.

Recommended practice for 14½-deg. and 20-deg. full-depth tooth systems, to standardize the present use

of these straight-sided basic rack systems so that there will be uniformity of practice, was offered by H. J. Eberhardt, Newark Gear Cutting Machine Co., Newark, N. J., chairman of the tooth form committee. Future practice may, it was said, eliminate some of the systems now in use, so that, instead of four, there may be one or, at most, two.

Tables of diameter modification for use when it is desired to avoid undercut or interference, to have full involute action, are included in the report. Beginning with 31 teeth and less for the 14½-deg. system, and with 17 teeth and less for the 20-deg. system, the modifications are calculated for 1 DP, the values for the other pitches being found by dividing by the desired pitch. The amount that the pinion is increased in diameter should also be used to decrease the mating gear, to maintain the standard center distances. The tables include also circular tooth thicknesses for both pinion and gear for 1 DP, when using the long and short addendums, and when both are conjugate from the standard basic rack.

In the discussion of this recommended practice, it was suggested that a clause be added to the effect that there will be a limiting number of teeth in gears mating with the pinions specified, to assure full involute action.

Non-Metallic Gearing Practice Changes

Changes in the practice recommended in May, 1926, for computing the hp. of non-metallic spur gears, composed of laminated phenolic materials or rawhide, were offered by the non-metallic gearing committee, the chairman of which is T. C. Roantree, Westinghouse Electric & Mfg. Co., East Pittsburgh. Changes were proposed in the table of values for safe working stress for pitch line speed in feet per minute. This change in practice is based in part on tests conducted at the Massachusetts Institute of Technology and the University of Toronto, as well as by results obtained in recent everyday practice.

The worm gear committee, headed by J. C. O'Brien, Pittsburgh Gear & Machine Co., Pittsburgh, offered a revision of earlier recommended practice. There are now two practices, one for the design of worm gearing using existing hobs, and the other for the design of industrial worm gearing when new hobs are to be made. In the former recommendation, both of these were combined. Except for the rearrangement, the changes made relate only to minor details.

The inspection committee has completed its original program. Data on the subject of "noise" are being collected, but none of the data on hand appear applicable to the calibration of gear noises. F. G. Eppley, Albaugh-Dover Mfg. Co., Chicago, is chairman of the committee.

Progress of the special research on the strength of gear teeth, being conducted under the auspices of the A. S. M. E. and the A. G. M. A. at the Massachusetts Institute of Technology, Cambridge, Mass., was outlined briefly by Earle Buckingham, professor in the department of mechanical engineering of that institution.

Four reports of this investigation have been published, and two more will be issued shortly. Study of the data obtained from the various series of tests has indicated the need for a detailed analysis of all phases of gear-tooth action under load before the test results can be properly interpreted. A number of these fundamental studies, such as the part played by the elasticity of the gear materials, are being made.

Technical Papers at Gear Meeting

"NORMAL Pitch Measurements," by B. Wheeler, Westinghouse Electric & Mfg. Co., East Pittsburgh, was one of the technical papers presented during the convention. It sets forth some of the work done by the Westinghouse and R. D. Nuttall companies in endeavoring to produce gearing which would be smooth and quiet in operation.

The development and use of normal pitch instruments was described and was illustrated by lantern slides. Investigations of normal pitch would, it was held, often lead to clearing up many troublesome gearing problems. Inspection of normal pitch was said also to be a satisfactory and easy method of insuring better and more consistent results in gearing manufacture.

A paper which was received with interest was that of P. L. Tenney, Muncie Products Co., Muncie, Ind., on "Equilibrium Factor in Gear Shifting." More than 200 devices proposed as panaceas for the present method of gear shifting have been examined by Mr. Tenney. Many of them, he said, are quite workable and some are highly ingenious, but none have measured up to the commercial requirements of today's motor car market. The problem seems to be deeper rooted than plain mechanics, he stated. There is something in our nervous and physical make-up, he said, which is responsible for the selection of the present control, and not merely the mechanics of design. This factor, the sense of equilibrium or balance, was thought to have influenced our choice of control more than is realized.

"Teamwork for Improving Products and Methods," an address by Z. C. Dickinson, associate professor of economics, University of Michigan, dealt with some of the difficulties of employee suggestion systems. Inviting suggestions of any kind is a step in the direction of teamwork, he said. One method of overcoming the resistance of foremen to the suggestion system is, he thought, by example, by inviting suggestions from the minor executives and, instead of asking "why should I change this practice?" that the attitude of "why not change this practice?"

In presenting the report of the industrial relations committee, E. W. Sawtelle, Tool Steel Gear & Pinion Co., Cincinnati, chairman, called attention to the work of the National Metal Trades Association along industrial relations lines, mentioning in particular the latest reports on pension plans, an abstract of which appeared in THE IRON AGE of April 28, page 1212.

Zinc Export Association Formed

WASHINGTON, May 16.—The Zinc Export Association, Inc., 61 Broadway, New York, has filed papers under the Webb-Pomerene export law with the Federal Trade Commission for the purpose of exporting metallic zinc in slabs. Under the act the organization is automatically set up with the filing of the papers.

Officers of the association are: A. J. McKay, president; B. W. Zimmer, Charles T. Orr and A. E. Bendelari, vice-presidents; W. A. Ogg, treasurer; C. H. Klaustermeyer, secretary; and Ernest V. Gent, assistant secretary and assistant treasurer. Members are: American Metal Co., Ltd., New York; Athletic Mining & Smelting Co., Joplin, Mo.; American Zinc, Lead & Smelting Co., Boston.; Illinois Zinc Co., Chicago; Hegeler Zinc Co.; Danville, Ill.; Matthiessen & Hegeler Zinc Co., La Salle, Ill.; Grasselli Chemical Co., Cleveland; Quinton Spelter Co., Joplin, Mo.; United Zinc Smelting Corporation, New York; Fort Smith Spelter Co., Greencastle, Ind.; and Eagle-Picher Lead Co., Chicago.

Will Probe Sales Below Cost

The economic effects upon prosperity of taking business below the cost of manufacture will be studied from all angles at the eighth International Cost Conference, which opens in Chicago on June 13, under the auspices of the National Association of Cost Accountants. The question will be considered from the standpoint of the effect of such practices upon the individual concern, the industry of which it is a part and the general business structure.

The association has 3200 industrial companies in its membership of over 4000. Each of the 30 chapters will send delegates. C. M. Finney, vice-president, Worthington Pump & Machinery Corporation, New York, is president.

In addition to the question of selling below cost, the conference will discuss standard costs, forecasts, budgets and controls. How to make cost information more vivid to management on one hand and factory foremen on the other will also be considered.

Iron and Steel Markets

Steel Market in a Waiting Mood

Shrinking Demand and Output, but Production Above Last Year —Look to Third Quarter Covering to Light the Way—Lower Pig Iron, Scrap and Coke

SHRINKAGE in new business in steel is bringing an adjustment in production, but output is still about 7 per cent higher than it was a year ago. Deliveries can be made, if anything, more promptly than ever, and buyers are specializing in reducing inventories and ordering in small lots.

Important price changes are lacking in steel products, save that sheet makers are having some success in getting more money on the small volume of fresh purchases. In cold-rolled strips revisions are in progress that are calculated to produce higher prices. Some hot-rolled strip mills have opened their books for third quarter business at present prices.

In a measure the market awaits the opening of third quarter buying. Then some light will be thrown on the strength of the price structure and the trend of production, as no major consuming line at present gives a clear picture of what it promises.

Sheet ingot production in the country's leading steel district, centered in Pittsburgh, has fallen under 75 per cent, compared with less than 70 per cent in May last year. Three fewer steel works blast furnaces are active there than a week ago, and two or three more are about to go out. The Chicago district continues at not far from a 90 per cent gait.

With some companies new bookings are equivalent to less than 50 per cent of capacity. The higher rate of operations has been sustained in part by producing against regular customer requirements ahead of actual specifications. Backlogs of unfilled orders are getting thin.

Basic pig iron in the Valleys has declined 50c. a ton for the second time in a fortnight. Producers who believed the coal strike would advance prices and accumulated supplies, are now anxious to reduce stocks. Bessemer iron at Valley furnaces has had a corresponding drop. Lake Erie producers in reaching into southwestern Ohio and Indiana have made concessions of 50c. to 75c. In New England, increasingly keen competition among nearby producers is eliminating Buffalo as the ruling base and independent local furnace bases are being set up.

Throughout the country, interest in iron for third quarter delivery is lacking. A canvass of foundry iron consumers in the East discloses that second quarter purchases exceeded needs.

Sales of heavy melting steel scrap to two Eastern steel companies, totaling 65,000 tons, failed to strengthen the market. At Cleveland, Cincinnati and St. Louis such scrap has declined 25c. a ton. Two water shipments of scrap, aggregating 7000 tons, have been moved this season from Detroit to Buffalo, which absorbed a considerable tonnage of Detroit scrap last year.

The New York Central ordered 3500 freight cars, 60 locomotives and 175 passenger cars and the Erie bought 80 locomotives. Altogether, the week's buying of locomotives was 162.

Rail mills at Chicago booked 10,000 tons for additional current needs of two railroads and they are able to remain at an 80 per cent operating rate. Sales of track accessories have expanded.

Although the crest of the spring building demand seems to have passed, fabricated steel work is active, the week adding about 29,000 tons in orders, including 3100 tons for oil tanks at Los Angeles. New projects appeared requiring 22,500 tons.

Bookings of fabricated structural steel in April are computed at 241,680 tons, or 17 per cent above the March total of 206,700 tons. For the first four months, sales were 4½ per cent ahead of either 1926 or 1925.

Free buying of steel for new models of automobiles is expected in July.

Bars have been in somewhat larger demand from the farm machinery makers, who are making a bid for increased foreign trade. Leading items in the concrete reinforcing field are 2200 tons for Philadelphia sewer work and 1800 tons for waterworks construction near St. Louis.

The sales of sheets at advances of as much as $2 a ton over prices of a week ago give makers hope that they can close third-quarter business at the higher prices recently named. April sales of independent sheet steel makers reached 292,960 net tons, a drop of 15 per cent from the March total of 345,900 tons. Manufacturers of portable and sheet metal houses are preparing for demands expected from the flooded areas.

Zinc quotations have crumbled to 6c., St. Louis, the lowest price since Aug. 2, 1924. Tin prices still hold at high levels, the present 67c. quotation comparing with 72.50c. on Nov. 23, 1926.

THE IRON AGE composite prices moved in opposite directions. Finished steel advanced to 2.367c. per lb. from 2.353c. last week, and pig iron dropped to $19.07 a ton from $19.13 last week.

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics
At Date, One Week, One Month, and One Year Previous

Pig Iron, Per Gross Ton:	May 17, 1927	May 10, 1927	Apr. 19, 1927	May 18, 1926
No. 2, fdy., Philadelphia	$21.76	$21.76	$21.76	$22.26
No. 2, Valley furnace	18.50	18.50	18.50	19.00
No. 2, Southern, Cin'ti	21.69	21.69	21.69	25.69
No. 2, Birmingham	18.00	18.00	18.00	22.00
No. 2 foundry, Chicago*	20.00	20.00	20.00	21.50
Basic, del'd eastern Pa.	20.75	20.75	20.75	21.75
Basic, Valley furnace	*18.00*	18.50	19.00	18.50
Valley Bessemer, del'd P'gh	*20.76*	21.26	21.26	21.26
Malleable, Chicago*	20.00	20.00	20.00	21.50
Malleable, Valley	18.50	18.50	18.50	19.00
Gray forge, Pittsburgh	19.76	19.76	19.76	20.26
L. S. charcoal, Chicago	27.04	27.04	27.04	29.04
Ferromanganese, furnace	95.00	95.00	100.00	88.00
Rails, Billets, etc., Per Gross Ton:				
O.-h. rails, heavy, at mill	$43.00	$43.00	$43.00	$43.00
Light rails at mill	36.00	36.00	36.00	34.00
Bess. billets, Pittsburgh	33.00	33.00	33.00	35.00
O.-h. billets, Pittsburgh	33.00	33.00	33.00	35.00
O.-h. sheet bars, P'gh	34.00	34.00	34.00	36.00
Forging billets, P'gh	39.00	39.00	40.00	40.00
O.-h. billets, Phila	39.30	39.30	39.30	40.30
Wire rods, Pittsburgh	42.00	42.00	42.00	45.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb.	1.90	1.90	1.90	1.90
Finished Iron and Steel,				
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Iron bars, Philadelphia	2.12	2.12	2.12	2.22
Iron bars, Chicago	2.00	2.00	2.00	2.00
Steel bars, Pittsburgh	1.85	1.85	1.90	1.90
Steel bars, Chicago	2.00	2.00	2.00	2.10
Steel bars, New York	2.19	2.19	2.24	2.24
Tank plates, Pittsburgh	1.85	1.85	1.85	1.85
Tank plates, Chicago	2.00	2.00	2.00	2.10
Tank plates, New York	2.19	2.19	2.19	2.24
Beams, Pittsburgh	1.80	1.80	1.90	1.90
Beams, Chicago	2.00	2.00	2.00	2.10
Beams, New York	2.14	2.14	2.14	2.24
Steel hoops, Pittsburgh	2.30	2.30	2.30	2.50

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

Sheets, Nails and Wire,	May 17, 1927	May 10, 1927	Apr. 19, 1927	May 18, 1926
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Sheets, black, No. 24, P'gh	*2.90*	2.80	2.75	3.00
Sheets, black, No. 24, Chicago dist. mill	3.10	3.10	2.95	3.20
Sheets, galv., No. 24, P'gh	*3.75*	3.65	3.60	3.90
Sheets, galv., No. 24, Chicago dist. mill	3.95	3.95	3.85	4.15
Sheets, blue, 9 & 10, P'gh	*2.25*	2.20	2.15	2.40
Sheets, blue, 9 & 10, Chicago dist. mill	2.35	2.35	2.35	2.60
Wire nails, Pittsburgh	2.50	2.50	2.55	2.65
Wire nails, Chicago dist. mill	*2.55*	2.60	2.60	2.70
Plain wire, Pittsburgh	2.40	2.40	2.40	2.50
Plain wire, Chicago dist. mill	2.45	2.45	2.45	2.55
Barbed wire, galv., P'gh	*3.20*	3.25	3.25	3.35
Barbed wire, galv., Chicago dist. mill	*3.25*	3.30	3.30	3.40
Tin plate, 100 lb. box, P'gh	$5.50	$5.50	$5.50	$5.50
Old Material, Per Gross Ton:				
Carwheels, Chicago	$14.25	$14.25	$14.75	$15.00
Carwheels, Philadelphia	16.00	16.00	16.00	17.00
Heavy melting steel, P'gh	15.50	15.50	16.50	15.50
Heavy melting steel, Phila.	14.00	14.00	14.50	15.00
Heavy melting steel, Ch'go	12.25	12.25	13.00	12.00
No. 1 cast, Pittsburgh	15.75	15.75	16.00	16.50
No. 1 cast, Philadelphia	17.00	17.00	17.00	17.00
No. 1 cast, Ch'go (net ton)	16.00	16.00	16.50	15.75
No. 1 RR. wrot, Phila.	16.50	16.50	16.50	17.00
No. 1 RR. wrot, Ch'go (net)	11.50	11.50	12.25	11.00
Coke, Connellsville, Per Net Ton at Oven:				
Furnace coke, prompt	*$2.90*	$3.00	$3.15	$2.90
Foundry coke, prompt	4.00	4.00	4.00	4.00
Metals,				
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York	13.12½	13.12½	13.12½	14.00
Electrolytic copper, refinery	12.75	12.75	12.87½	13.62½
Zinc, St. Louis	*6.00*	6.15	6.37½	6.85
Zinc, New York	*6.45*	6.50	6.72½	7.20
Lead, St. Louis	*6.40*	6.40	6.90	7.50
Lead, New York	*6.65*	6.75	7.15	7.75
Tin (Straits), New York	...	68.00	68.62½	62.00
Antimony (Asiatic), N. Y.	*12.50*	13.75	15.50	12.00

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

Pittsburgh

Steel Output Declines to 75 Per Cent, But Still Exceeds Rate of a Year Ago

PITTSBURGH, May 17.—Steel consumers are "dieting," and with their order books shrinking and new business well below the current rate of production, steel producers are finding it necessary to curtail output. In the past week three steel works blast furnaces have been blown out or banked, and lack of orders for steel rather than production to the limit of their linings is the reason for the suspensions. It is reported that two or three other steel works furnaces are about to be placed on the idle list. Steel ingot production is below 75 per cent of capacity in this and nearby districts, with the Steel Corporation making a somewhat better showing than the independents. The latter may be estimated as running at between 70 and 75 per cent, which is about five points poorer than the leading producer. While the present rate of steel output represents a considerable decline from that of March and early April, it is by no means unfavorable as compared with this time last year, when this and nearby districts were below a 70 per cent of capacity operation.

Production is roughly about 7 per cent greater than it was 12 months ago, and further comparison between present conditions and those of a year ago is unfavorable only so far as prices are concerned. If an estimate made early in the year that 1927 would be a 90 per cent year as compared with 1926 expressed common expectations, there is little to complain of so far as business this year to date is concerned. A rising production trend marked the first three and one-half months of this year. It was not until the middle of February that there was much increase in consumption as expressed in real orders, or until that date that consumption really justified the rate of production. From the middle of February through March consumption mounted even more rapidly than did production, and for a brief period there was a condition of orders exceeding output, partly explained by the desire of consumers for some protection against a possible shortage resulting from the soft coal strike. April activity was high because of the order carry-over from March. Current dullness may be ascribed to some recession in rate of consumption and to the fact that users' requirements are being satisfied from old purchases to greater extent than was true early in this year. Curtailed new buying and curtailed new production is usually the accompaniment of a liquidation period such as now is in progress. It is likely to be brief, however, because neither producers nor consumers have large stocks to liquidate.

The current demand is hand to mouth; it has been for a long time, but it is more so now than recently, because there is nothing in sight to suggest any immediate inability of steel makers to supply all demands and supply them promptly. It is estimated that new business is equal to less than 50 per cent of capacity, against which there is a production above 70 per cent. That gap must be narrowed, and since there has been a thorough liquidation of the primary materials, there are many who expect to see the bridging accomplished as much through increased demand as in a sharp cut in production.

Important price changes are lacking in steel products. Sheet makers are having some success in getting

higher prices, and in cold-rolled strips revisions are in progress calculated to produce a higher market. The steel-making grades of pig iron are offered at 50c. a ton lower than last week. The scrap market is extremely dull, and great difficulty is experienced in finding an outlet even at the lowest prices in a year. The coke market is still weak.

Pig Iron.—Melters are using up iron bought in the latter part of last year or the first part of this year, and as the coal strike failed to bring about any shortage of coke supplies or any stiffening in the price of iron, they see no occasion now to add to their reserves. Producers, on the other hand, are a little more anxious for business and have reduced their asking prices on the steel-making grades by 50c. a ton in the hope of stimulating enough demand to lighten their stocks, which were accumulated in the belief that higher prices were a certain result of the coal strike. Valley basic iron now is offered at $18, furnace, and Bessemer at the usual differential or $1 a ton over basic. There is very little inquiry for Bessemer iron, but a few fair-sized inquiries are out for basic iron, chiefly from consumers usually in the market when "bargain" prices are likely to be made. Only small lots of foundry and malleable iron are being sold, but these are at recently quoted prices. The Carnegie Steel Co. has taken off one of its Clairton furnaces since a week ago, and the Pittsburgh Steel Co. has blown out one of its two furnaces, while the Pittsburgh Crucible Steel Co. has banked one of its two stacks.

Prices per gross ton f.o.b. Valley furnace:

Basic	$18.00
Bessemer	19.00
Gray forge	18.00
No. 2 foundry	18.50
No. 3 foundry	18.00
Malleable	18.50
Low phosphorus, copper free	28.00

Freight rate to the Pittsburgh or Cleveland district, $1.76.

Ferroalloys.—Quietly there has been fairly free contracting for last half tonnages of ferromanganese, and it is estimated that fully 90 per cent of the consumers are now covered for the remainder of the year. While British producers have succeeded in getting some business, the great bulk of the tonnage has gone to domestic producers, whose price, although the same as that of the British makers, or $95, Atlantic seaboard, carries with it a guarantee against a decline, a provision that is not part of the British contracts. Failure of contract customers to specify fully for spiegeleisen has resulted in a somewhat larger spot supply of that alloy, but there seems to be an outlet for the released tonnages and recent prices are holding. Users of high-grade ferrosilicon are specifying steadily against contracts.

Semi-Finished Steel.—Trading is very slow in billets, slabs, and sheet bars, and as non-integrated manufacturers are well stocked against their immediate requirements and are uninterested in fresh supplies, no real test of quotations, which are unchanged, is afforded. It is still a fairly common supposition that if some makers were offered attractive tonnages for quick shipment they would not insist on the public quotations. No real test of 1.90c. on skelp is possible, as the demand is extremely light. Forging quality billets are selling at $39 to $40, base, and wire rods are quoted at $42 to $43, base, Pittsburgh or Cleveland, for small tonnages, with most of such business carrying the lower figure.

Wire Products.—While mills in this district have not formally recognized the lower prices announced by a large Eastern maker late last week on nails, staples, and barbed wire, they have authorized their salesmen to meet the cut. While there is still a nominal quotation of $2.55, base, per keg, Pittsburgh, on nails, actual sales prices are $2.50, base, for bright and coated nails, $3.20 for galvanized staples and galvanized barbed wire, and $2.95 for polished staples and painted barbed wire. Plain wire is not included in the revision, and this means also the maintenance of recent prices on the products based on plain wire. In a general way, the price revision meets a situation created by competition, which was less marked here than in other distributing markets.

Rails and Track Supplies.—The Norfolk & Western Railway, as is its practice, is expected to enter the market in July for its standard-section rail requirements for the ensuing 12 months. Current demand is light, and production is dropping steadily as orders are completed. Not much activity is noted in light-section rails, but prices are firm, since makers take the position that orders would not be stimulated by lower figures. Much of the current movement in track accessories is at the expense of order books, as new business is light.

Tubular Goods.—Concerted action in the direction of curtailment of oil production may eventually produce a more favorable market situation in that product, but its effect upon the pipe situation is bad, and it is not an uncommon opinion that this year will prove as poor in production and shipments as last year was good. Steady demand is reported for standard-weight pipe, and few makers lack line-pipe business. Late reports suggest the early possibility of the placing of the 22-in. gas line from Amarillo, Tex., to Denver, calling for about 450 miles of that size. Boiler tubes still reflect in price the fact that there are more offered than can be readily absorbed.

Sheets.—With actual sales taking place at advances of as much as $2 a ton over the prices of a week ago, makers in this district are hopeful of being able to fully establish the higher prices recently named on third quarter business. Manufacturers generally gave their customers protection over the remainder of this quarter before the advance in prices became effective and, having thus accumulated a fair-sized order book, have been able to take a stronger price stand. Larger producers are adhering firmly to 3c., base Pittsburgh, for black sheets, 3.85c., base, for galvanized, and 2.25c., base, for blue annealed, and some business has been placed at those prices. On the last named grade that price is now the ruling one, but black sheets are still to be had at 2.90c., base, and galvanized at 3.75c., base. Automobile body sheets are moving very steadily, but chiefly against old orders, since car manufacturers have not yet begun to buy against new models to come out late in the summer, and present production is

The Iron Age Composite Prices

Finished Steel

May 17, 1927, 2.367c. a Lb.

One week ago	2.353c.
One month ago	2.367c.
One year ago	2.403c.
10-year pre-war average	1.689c.

Based on steel bars, beams, tank plates, plain wire, open-hearth rails, black pipe and black sheets. These products constitute 87 per cent of the United States output of finished steel.

	High		Low	
1927	2.453c.,	Jan. 4;	2.339c.,	April 26
1926	2.453c.,	Jan. 5;	2.403c.,	May 18
1925	2.560c.,	Jan. 6;	2.396c.,	Aug. 18
1924	2.789c.,	Jan. 15;	2.460c.,	Oct. 14
1923	2.824c.,	April 24;	2.446c.,	Jan. 2

Pig Iron

May 17, 1927, $19.07 a Gross Ton

One week ago	$19.13
One month ago	19.21
One year ago	20.71
10-year pre-war average	15.72

Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

	High		Low	
1927	$19.71,	Jan. 4;	$18.96,	Feb. 15
1926	21.54,	Jan. 5;	19.46,	July 13
1925	22.50,	Jan. 13;	18.96,	July 7
1924	22.88,	Feb. 26;	19.21,	Nov. 3
1923	30.86,	March 20;	20.77,	Nov. 20

Mill Prices of Finished Iron and Steel Products

Iron and Steel Bars

Soft Steel

	Base Per Lb.
F.o.b. Pittsburgh mills	1.85c. to 1.90c.
F.o.b. Chicago	2.00c. to 2.10c.
Del'd Philadelphia	2.17c. to 2.22c.
Del'd New York	2.19c. to 2.24c.
Del'd Cleveland	2.09c.
F.o.b. Cleveland	1.85c. to 1.90c.
F.o.b. Birmingham	2.05c. to 2.15c.
C.i.f. Pacific ports	2.35c.
F.o.b. San Francisco mills	2.35c. to 2.40c.

Billet Steel Reinforcing

F.o.b. Pittsburgh mills	1.90c.
F.o.b. Birmingham	2.00c.

Rail Steel

F.o.b. mill	1.75c. to 1.80c.
F.o.b. Chicago	1.90c. to 2.00c.

Iron

Common iron, f.o.b. Chicago	2.00c.
Refined iron, f.o.b. P'gh mills	2.75c.
Common iron, del'd Philadelphia	2.12c. to 2.22c.
Common iron, del'd New York	2.14c. to 2.24c.

Tank Plates

	Base Per Lb.
F.o.b. Pittsburgh mill	1.80c. to 1.90c.
F.o.b. Chicago	2.00c.
F.o.b. Birmingham	1.95c. to 2.05c.
Del'd Cleveland	2.09c.
Del'd Philadelphia	2.12c. to 2.22c.
Del'd New York	2.14c. to 2.24c.
C.i.f. Pacific ports	2.25c. to 2.30c.

Structural Shapes

	Base Per Lb.
F.o.b. Pittsburgh mills	1.80c. to 1.90c.
F.o.b. Chicago	2.00c.
F.o.b. Birmingham	2.05c. to 2.15c.
Del'd Cleveland	2.09c.
Del'd Philadelphia	2.07c. to 2.22c.
Del'd New York	2.09c. to 2.24c.
C.i.f. Pacific ports	2.35c.

Hot-Rolled Flats (Hoops, Bands and Strips)

	Base Per Lb.
All gages, narrower than 6 in., P'gh	2.30c.
All gages, 6 in. to 12 in., P'gh	*2.10c.
Nos. 13 and 14 gage, 12 in. to 14 in., P'gh, net	2.30c.
Nos. 15 and 16 gage, 12 in. to 14 in., P'gh, net	2.40c.
All gages, narrower than 6 in., Chicago,	2.40c. to 2.60c.
All gages, 6 in. and wider, Chicago,	2.30c. to 2.50c.

*Mills follow plate or sheet prices according to gage on wider than 14 in.

Cold-Finished Steel

	Base Per Lb.
Bars, f.o.b. Pittsburgh mills	2.40c.
Bars, f.o.b. Chicago	2.40c.
Bars, Cleveland	2.35c.
Shafting, ground, f.o.b. mill	*2.55c. to 3.00c.
Strips up to 12 in., f.o.b. Pittsburgh mill	3.00c. to 3.25c.
Strips up to 12 in., f.o.b. Cleveland mills	3.00c. to 3.25c.
Strips up to 12 in., delivered Chicago	3.30c. to 3.55c.
Strip sheets, 12 in. and wider, Pittsburgh mill	3.00c.
Strip sheets, 12 in. and wider, Cleveland mill	3.00c.
Strip sheets, 12 in. and wider, Chicago mill	3.30c.

*According to size.

Wire Products

(To jobbers in car lots, f.o.b. Pittsburgh and Cleveland)

	Base Per Keg
Wire nails	$2.50 to $2.55
Galv'd nails	4.50 to 4.55
Galvanized staples	3.20 to 3.25
Polished staples	2.95 to 3.00
Cement coated nails	2.50 to 2.55

	Base Per 100 Lb.
Bright plain wire, No. 9 gage	$2.40
Annealed fence wire	2.55
Spring wire	3.40
Galv'd wire, No. 9	3.00
Barbed wire, galv'd	$3.20 to 3.25
Barbed wire, painted	2.95 to 3.00

Chicago district mill and delivered Chicago prices are $1 per ton above the foregoing. Birmingham mill prices $3 a ton higher; Worcester, Mass., mill $3 a ton higher on production of that plant; Duluth, Minn., mill $2 a ton higher; Anderson, Ind., $1 higher.

Woven Wire Fence

	Base to Retailers Per Net Ton
F.o.b. Pittsburgh	$65.00
F.o.b. Cleveland	65.00
F.o.b. Anderson, Ind.	66.00
F.o.b. Chicago district mills	67.00
F.o.b. Duluth	68.00
F.o.b. Birmingham	68.00

Sheets

Blue Annealed

	Base Per Lb.
Nos. 9 and 10, f.o.b. Pittsburgh	2.25c.
Nos. 9 and 10, f.o.b. Chicago dist. mill	2.35c.
Nos. 9 and 10, del'd Philadelphia	2.57c.
Nos. 9 and 10, f.o.b. Birmingham	2.35c. to 2.45c.

Box Annealed, One Pass Cold Rolled

No. 24, f.o.b. Pittsburgh	2.90c. to 3.00c.
No. 24, f.o.b. Ch'go dist. mill	3.10c.
No. 24, del'd Philadelphia	3.22c. to 3.32c.
No. 24, f.o.b. Birmingham	3.10c. to 3.15c.

Metal Furniture Sheets

No. 24, f.o.b. Pittsburgh, A grade	4.00c. to 4.10c.
No. 24, f.o.b. Pittsburgh, B grade	3.90c. to 4.00c.

Galvanized

No. 24, f.o.b. Pittsburgh	3.75c. to 3.85c.
No. 24, f.o.b. Chicago dist. mill	3.95c.
No. 24, del'd Philadelphia	4.07c. to 4.17c.
No. 24, f.o.b. Birmingham	3.95c. to 4.05c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh	3.10c.
No. 28, f.o.b. Chicago dist. mill	3.20c.

Automobile Body Sheets

No 20, f.o.b. Pittsburgh	4.15c. to 4.25c.

Long Ternes

No. 24, 8-lb. coating, f.o.b. mill	4.20c. to 4.30c.

Tin Plate

	Per Base Box
Standard cokes, f.o.b. P'gh district mills	$5.50
Standard cokes, f.o.b. Gary and Elwood, Ind.	5.60

Terne Plate

(*F.o.b. Morgantown or Pittsburgh*)

(Per package, 20 x 28 in.)

8-lb. coating, 100 lb. base	$11.40	20-lb. coating I.C.	$16.20
8-lb. coating I.C.	11.70	25-lb. coating I.C.	17.90
15-lb. coating I.C.	14.85	30-lb. coating I.C.	19.45
		40-lb. coating I.C.	21.65

Alloy Steel Bars

(F.o.b. Pittsburgh or Chicago)

S. A. E. Series Numbers		Base Per 100 Lb.
2100*	(1½% Nickel, 0.10% to 0.20% Carbon)	$3.00 to $3.15
2300	(3½% Nickel)	4.30 to 4.40
2500	(5% Nickel)	5.50
3100	(Nickel Chromium)	3.30 to 3.40
3200	(Nickel Chromium)	4.75 to 5.00
3300	(Nickel Chromium)	7.00 to 7.25
3400	(Nickel Chromium)	6.25 to 6.50
5100	(Chromium Steel)	3.30 to 3.40
5200*	(Chromium Steel)	7.00 to 7.50
6100	(Chrom. Vanadium bars)	4.20 to 4.30
6100	(Chrom. Vanad. spring steel)	3.80
9250	(Silicon Manganese spring steel)	3.20 to 3.25
	Carbon Vanadium (0.45% to 0.55% Carbon, 0.15% Vanad.)	4.10 to 4.20
	Nickel Chrome Vanadium (0.60 Nickel, 0.50 Chrom., 0.15 Vanad.)	4.20 to 4.30
	Chromium Molybdenum bars (0.80—1.10 Chrom., 0.25—0.40 Molyb.)	4.25 to 4.35
	Chromium Molybdenum bars (0.50—0.70 Chrom., 0.15—0.25 Molyb.)	3.40 to 3.50
	Chromium Molybdenum spring steel (1—1.25 Chrom., 0.30—0.50 Molybdenum)	4.50 to 4.75

Above prices are for hot-rolled steel bars, forging quality. The ordinary differential for cold-drawn bars is 1c. per lb. higher. For billets 4 x 4 to 10 x 10 in. the price for a gross ton is the net price for bars of the same analysis. For billets under 4 x 4 in. down to and including 2½-in. squares, the price is $5 a gross ton above the 4 x 4 billet price.

*Not S. A. E. specification, but numbered by manufacturers to conform to S. A. E. system.

Rails

	Per Gross Ton
Standard, f.o.b. mill	$43.00
Light (from billets), f.o.b. mill	36.00
Light (from rail steel), f.o.b. mill	34.00
Light (from billets), f.o.b. Ch'go mill	$36.00 to 38.00

Track Equipment

(F.o.b. Mill)

	Base Per 100 Lb.
Spikes, ⅜ in. and larger	$2.80 to $3.00
Spikes, ½ in. and smaller	2.80 to 3.15
Spikes, boat and barge	3.25
Tie plates, steel	2.35
Angle bars	2.75
Track bolts, ⅞ in. and ⅞ in.	3.90 to 4.00
Track bolts, ¾ in. and smaller, per 100 count	70 per cent off list

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

Butt Weld

Steel Inches	Black	Galv.	Iron Inches	Black	Galv.
⅛	45	19½	¼ to ⅜	+11	+39
¼ to ⅜	51	25½	½	22	2
½	56	42½	¾	28	11
¾	60	48½	1 to 1½	30	13
1 to 3	62	50½			

Lap Weld

2	55	43½	2	23	7
2½ to 6	59	47½	2½	26	11
7 and 8	56	43½	3 to 6	28	13
9 and 10	54	41½	7 to 12	26	11
11 and 12	53	40½			

Butt Weld, extra strong, plain ends

⅛	41	24½	¼ to ⅜	+19	+54
¼ to ⅜	47	30½	½	21	17
½	53	42½	¾	28	12
¾	58	47½	1 to 1½	30	14
1 to 1½	60	49½			
2 to 3	61	50½			

Lap Weld, extra strong, plain ends

2	53	42½	2	23	9
2½ to 4	57	46½	2½ to 4	29	15
4½ to 6	56	45½	4½ to 6	28	14
7 to 8	52	39½	7 to 8	21	15
9 and 10	45	32½	9 to 12	16	2
11 and 12	44	31½			

To the large jobbing trade the above discounts on steel pipe are increased on black by one point, with supplementary discount of 5%, and on galvanized by 1½ points, with supplementary discount of 5%. On iron pipe, both black and galvanized, the above discounts are increased to large jobbers by one point with supplementary discounts of 5 and 2½%.

Note.—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Base Discounts, f.o.b. Pittsburgh

Lap Welded Steel		Charcoal Iron	
2 to 2½ in.	27	1½ in.	+18
2½ to 2¾ in.	37	1⅝ to 1⅞ in.	+ 8
3 in.	40	2 to 2¼ in.	— 2
3¼ to 3½ in.	42½	2½ to 3 in.	— 7
4 to 13 in.	46	3¼ to 4½ in.	— 9

Beyond the above discounts, 7 fives extra are given on lap welded steel tubes and 2 tens to 2 tens and 1 five on charcoal iron tubes.

Standard Commercial Seamless Boiler Tubes

Cold Drawn

1 in.	60	3 in.	45
1¼ to 1½ in.	52	3¼ to 3½ in.	47
1¾ in.	36	4 in.	50
2 to 2¼ in.	31	4½, 5 and 6 in.	45
2½ to 2¾ in.	39		

Hot Rolled

2 and 2¼ in.	37	3¼ and 3½ in.	53
2½ and 2¾ in.	45	4 in.	56
3 in.	51	4½, 5 and 6 in.	51

Less carloads, 4 points less. Add $8 per net ton for more than four gages heavier than standard. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. and lighter than standard gage to be held at mechanical tubes list and discount. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing

	Per Cent Off List
Carbon, 0.10% to 0.30%, base	55
Carbon, 0.30% to 0.40%, base	50

Plus differentials for lengths over 18 ft. and for commercially exact lengths. Warehouse discounts on small lots are less than the above.

largely on old models, for which they are largely covered on materials.

Tin Plate.—First half business is nearly completed, and there is little interest in third and fourth quarter requirements. Spot demands are small. Some of the independent producers are taking last half business at unchanged prices, but the leading producer has not yet had demands sufficient to prompt the naming of prices for the last six months of the year.

Cold-Finished Steel Bars and Shafting.—The automobile parts makers are taking out supplies very steadily, but it is the exception rather than the rule for makers here to be getting orders that amount to as much as the shipments. In other words, order books are growing slimmer. Automobile builders are working up raw material bought against their present models, and it is expected there will be a period of at least six weeks before they will buy with any freedom for their new models. The market here is still quoted at 2.40c., base Pittsburgh, on small lots subject to a preferential of $2 a ton to large-lot buyers.

Bolts, Nuts and Rivets.—Prices of bolts and nuts as established effective April 1 are holding well on such new business as is developing, but there is not much new business. Buyers generally were given considerable coverage against this quarter's requirements prior to April 1, orders being priced at the old list on the sizes that were advanced by the new list and on the new list on the sizes that were marked down. It is a little early for third quarter contracting, and that buying will provide the first real test of the new prices. April business fell well under that for March, and this month to date is below the same period in last month.

Warehouse Business.—Galvanized sheets out of local warehouses have been advanced $2 a ton in keeping with the recent mill advance, but no change has been made in black or blue annealed sheets, prices of which did not reflect the low mill prices recently common.

Steel and Iron Bars.—Mills in this district seem to have wiped out their backlogs of steel bars and are now dependent upon current demands to furnish rolling schedules. These demands are fairly constant, but producers hardly know from day to day where the next day's mill schedule is coming from. Prices lower than 1.90c., base Pittsburgh, on ordinary tonnages are not common in the Pittsburgh district.

Structural Steel.—The Pittsburgh district market is holding at 1.90c., base Pittsburgh, for ordinary tonnages of large structural shapes, but Pittsburgh mills are finding it difficult to secure that price outside of the Pittsburgh district, and on really sizable tonnages the price is governed by what the fabricators must have to make lump sum bids.

Plates.—Pittsburgh district railroad car builders shared heavily in the New York Central car awards of late last week, and mills here will be called upon to supply approximately 30,000 tons of steel, mostly plates. This sort of plate business commands a price of 1.80c., base Pittsburgh, and smaller tonnages bring 1.85c. to 1.90c., according to the size of the tonnage and whether it is for the Pittsburgh district or for shipment to outside points. Barge and pipe line business is providing a fair amount of engagement for plate mills.

Hot-Rolled Flats.—The automobile companies are taking a good deal of tonnage, but are not placing much new business and order books of makers of strips are shrinking steadily. Shipments now leaving the mills are for cars of the present models, and it is probable that there will be a lapse of a month or six weeks before there will be much real buying of steel against the new models. The report from Detroit suggests spotty production among car builders and also that retail sales are below expectations in a good many cases. The test of present prices is still ahead. Hoop and band sizes are slow, but prices are steady.

Coke and Coal.—Although curtailment of coke production has been sharp, it does not yet appear to have brought demand and supply together sufficiently to create any strength in prices. Good standard spot furnace coke, in fact, is 10c. per ton lower than a week ago, now being offered at $2.90 per net ton at ovens. Producing costs are placed at anywhere from $3.30 to $3.50. This suggests that if the producers hope to get third quarter contracts at prices that will yield a profit, they must bring about higher spot prices through further curtailment or cut their producing costs, which would be possible only through wage reductions. The pig iron market is so weak as to suggest inability on the part of makers to pay even the present contract prices of $3.50, and it begins to look as if wage reduction was the only way out of the dilemma. This might prove useful ammunition for the union mine leaders, who are looking for just such developments to improve their position. Incidentally, the development of strikes in the non-union fields may not be so far off as had been commonly believed; indeed, reports from parts of West Virginia and Kentucky suggest some unrest among the men. Spot foundry coke still is quoted at $4 to $4.50.

Old Material.—Two steel companies in this district have suspended shipments on orders, and with other consumers well covered, dealers have a problem in finding an outlet for the steel works grades. As against sales of heavy melting steel recently at $16 to a consumer, there is probably not a mill in this district that would pay $15.50. But the market hardly is quotable below that price, which is obtainable from dealers who have higher-priced orders and cannot figure that supplies will come out freely at present prices. The market is plainly weaker on machine shop turnings, with $11 the best mill bid, but with $11.50 obtainable from dealers with short sales to cover.

Warehouse Prices, f.o.b. Pittsburgh

	Base per Lb.
Plates	3.00c.
Structural shapes	3.00c.
Soft steel bars and small shapes	2.90c.
Reinforcing steel bars	2.75c.
Cold-finished and screw stock—	
Rounds and hexagons	3.60c.
Squares and flats	4.10c.
Bands	3.60c. to 3.65c.
Hoops	4.00c. to 4.50c.
Black sheets (No. 24 gage), 25 or more bundles	3.75c.
Galvanized sheets (No. 24 gage), 25 or more bundles	4.60c.
Blue annealed sheets (No. 10 gage), 25 or more sheets	3.30c.
Spikes, large	3.30c. to 3.40c.
Small	3.80c. to 5.25c.
Boat	3.80c.
Track bolts, ¾ in. and smaller, per 100 count,	62½ per cent off list
Machine bolts, per 100 count.	62½ per cent off list
Carriage bolts, per 100 count.	62½ per cent off list
Nuts, all styles, per 100 count,	62½ per cent off list
Large rivets, base per 100 lb	$3.50
Wire, black soft annealed, base per 100 lb	2.90
Wire, galvanized soft, base per 100 lb	2.90
Common wire nails, per keg	2.90
Cement coated nails, per keg	2.95

Prices per gross ton delivered consumers' yards in Pittsburgh and points taking the Pittsburgh district freight rate:

Basic Open-Hearth Furnace Grades:		
Heavy melting steel		$15.50
Scrap rails		15.00
Compressed sheet steel		14.50
Bundled sheets, sides and ends		13.50
Cast iron carwheels	15.50 to	16.00
Sheet bar crops, ordinary	16.00 to	16.50
Heavy breakable cast	14.50 to	15.00
No. 2 railroad wrought		15.50
Heavy steel axle turnings	14.00 to	14.50
Machine shop turnings	11.00 to	11.50
Acid Open-Hearth Furnace Grades:		
Railroad knuckles and couplers	18.00 to	18.50
Railroad coil and leaf springs	18.00 to	18.50
Rolled steel wheels	18.00 to	18.50
Low phosphorus billet and bloom ends	20.00 to	20.50
Low phosphorus, mill plate	19.50 to	20.00
Low phosphorus, light grade	17.00 to	17.50
Low phosphorus sheet bar crops	19.00 to	19.50
Heavy steel axle turnings	14.00 to	14.50
Electric Furnace Grades:		
Low phosphorus punchings	18.50 to	19.00
Heavy steel axle turnings	14.00 to	14.50
Blast Furnace Grades:		
Short shoveling steel turnings	11.00 to	11.50
Short mixed borings and turnings	11.00 to	11.50
Cast iron borings	11.00 to	11.50
No. 2 busheling	11.00 to	11.50
Rolling Mill Grades:		
Steel car axles	20.50 to	21.00
No. 1 railroad wrought	12.50 to	13.00
Cupola Grades:		
No. 1 cast	15.75 to	16.25
Rails 3 ft. and under	18.00 to	18.50
Malleable Grades:		
Railroad		15.50
Industrial		15.00
Agricultural		14.50

Semi-Finished Steel, Raw Materials, Bolts and Rivets

Mill Prices of Semi-Finished Steel

F.o.b. Pittsburgh or Youngstown

Billets and Blooms

	Per Gross Ton
Rerolling, 4-in. and over	$33.00
Rerolling, under 4-in. to and including 1¾-in.	34.00
Forging, ordinary	$39.00 to 40.00
Forging, guaranteed	44.00 to 45.00

Sheet Bars

	Per Gross Ton
Open-hearth or Bessemer	$34.00

Slabs

	Per Gross Ton
8 in. x 2 in. and larger	$33.00
Smaller than 8 in. x 2 in.	34.00

Skelp

	Per Lb.
Grooved	1.90c.
Sheared	1.90c.
Universal	1.90c.

Wire Rods

	Per Gross Ton
*Common soft, base	$42.00 to $43.00
Screw stock	$5.00 per ton over base
Carbon 0.20% to 0.40%	3.00 per ton over base
Carbon 0.41% to 0.55%	5.00 per ton over base
Carbon 0.56% to 0.75%	7.50 per ton over base
Carbon over 0.75%	10.00 per ton over base
Acid	15.00 per ton over base

*Chicago mill base is $42.50 to $44. Cleveland mill base, $42 to $43.

Prices of Raw Materials

Ores

Lake Superior Ores, Delivered Lower Lake Ports

	Per Gross Ton
Old range Bessemer, 51.50% iron	$4.55
Old range non-Bessemer, 51.50% iron	4.40
Mesabi Bessemer, 51.50% iron	4.40
Mesabi non-Bessemer, 51.50% iron	4.25
High phosphorus, 51.50% iron	4.15

Foreign Ore, c.i.f. Philadelphia or Baltimore

	Per Unit
Iron ore, low phos., copper free, 55 to 58% iron in dry Spanish or Algeria	10.50c.
Iron ore, Swedish, average 66% iron	9.75c. to 10.00c.
Manganese ore, washed, 52% manganese, from the Caucasus	40c. to 41c.
Manganese ore, Brazilian, African or Indian, basis 50%	40c. to 42c.
Tungsten ore, high grade, per unit, in 60% concentrates	$11.00 to $11.50

	Per Gross Ton
Chrome ore, Indian basic, 48% Cr_2O_3, crude, c.i.f. Atlantic seaboard	$22.50

	Per Lb.
Molybdenum ore, 85% concentrates of MoS_2, delivered	50c. to 55c.

Coke

	Per Net Ton
Furnace, f.o.b. Connellsville prompt	$2.90 to $3.00
Foundry, f.o.b. Connellsville prompt	4.00 to 4.50
Foundry, by-product, Ch'go ovens	9.75
Foundry, by-product, New England, del'd	12.00
Foundry, by-product, Newark or Jersey City, delivered	9.59 to 10.77
Foundry, Birmingham	5.50 to 6.00
Foundry, by-product, St. Louis	10.25

Coal

	Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines	$1.30 to $1.90
Mine run coking coal, f.o.b. W. Pa. mines	1.80 to 2.00
Mine run gas coal, f.o.b. Pa. mines	2.00
Steam slack, f.o.b. W. Pa. mines	1.25
Gas slack, f.o.b. W. Pa. mines	1.40 to 1.50

Ferromanganese

	Per Gross Ton
Domestic, 80%, furnace or seab'd	$95.00
Foreign, 80%, Atlantic or Gulf port, duty paid	95.00

Spiegeleisen

	Per Gross Ton Furnace
Domestic, 19 to 21%	$36.00 to $37.00
Domestic, 16 to 19%	36.00

Electric Ferrosilicon

	Per Gross Ton Delivered
50%	$85.00 to $87.50
75%	145.00

	Per Gross Ton Furnace		Per Gross Ton Furnace
10%	$35.00	12%	$39.00
11%	37.00	14 to 16%	$45 to 46.00

Bessemer Ferrosilicon

F.o.b. Jackson County, Ohio, Furnace

	Per Gross Ton		Per Gross Ton
10%	$34.00	12%	$38.00
11%	36.00		

Silvery Iron

F.o.b. Jackson County, Ohio, Furnace

	Per Gross Ton		Per Gross Ton
6%	$26.50	10%	$32.00
7%	27.50	11%	34.00
8%	28.50	12%	36.00
9%	30.00		

Other Ferroalloys

Ferrotungsten, per lb. contained metal, del'd	$1.00 to $1.05
Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr., per lb. contained Cr. delivered, in carloads	11.50c.
Ferrovanadium, per lb. contained vanadium, f.o.b. furnace	$3.15 to $3.65
Ferrocarbontitanium, 15 to 18%, per net ton, f.o.b. furnace, in carloads	$200.00
Ferrophosphorus, electric or blast furnace material, in carloads, 18%, Rockdale, Tenn., base, per net ton	$91.00
Ferrophosphorus, electric, 24%, f.o.b. Anniston, Ala., per net ton	$122.50

Fluxes and Refractories

Fluorspar

	Per Net Ton
Domestic, 85% and over calcium fluoride, not over 5% silica, gravel, f.o.b. Illinois and Kentucky mines	$17.00 to $18.00
No. 2 lump, Illinois and Kentucky mines	$20.00
Foreign, 85% calcium fluoride, not over 5% silica, c.i.f. Atlantic port, duty paid	$16.00
Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silica, f.o.b. Illinois and Kentucky mines	$32.50

Fire Clay

	Per 1000 f.o.b. Works	
	First Quality	Second Quality
Pennsylvania	$43.00 to $46.00	$35.00 to $38.00
Maryland	43.00 to 46.00	35.00 to 38.00
New Jersey	50.00 to 65.00	
Ohio	43.00 to 46.00	35.00 to 38.00
Kentucky	43.00 to 46.00	35.00 to 38.00
Missouri	43.00 to 46.00	35.00 to 38.00
Ground fire clay, per ton	7.00	

Silica Brick

	Per 1000 f.o.b. Works
Pennsylvania	$43.00
Chicago	52.00
Birmingham	50.00
Silica clay, per ton	$8.50 to 10.00

Magnesite Brick

	Per Net Ton
Standard sizes, f.o.b. Baltimore and Chester, Pa.	$65.00
Grain magnesite, f.o.b. Baltimore and Chester, Pa.	40.00

Chrome Brick

	Per Net Ton
Standard size	$45.00

Mill Prices of Bolts, Nuts, Rivets and Set Screws

Bolts and Nuts

Per 100 Pieces

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
†Machine bolts	70
†Carriage bolts	70
Lag bolts	70
Plow bolts, Nos. 1, 2, 3 and 7 heads	70
Hot-pressed nuts, blank or tapped, square	70
Hot-pressed nuts, blank or tapped, hexagon	70
C.p.c. and t. square or hex. nuts, blank or tapped	70
Washers*	6.75c. to 6.50c. per lb. off list

*F.o.b. Chicago and Pittsburgh. †Bolts with rolled threads up to and including ⅜ in. x 6 in. take 10 per cent lower list prices.

Bolts and Nuts

	Per Cent Off List
Semi-finished hexagon nuts	70
Semi-finished hexagon castellated nuts, S.A.E.	70
Stove bolts in packages	80, 10 and 5
Stove bolts in bulk	80, 10, 5 and 2½
Tire bolts	60 and 5

Large Rivets

(½-In. and Larger)

	Base per 100 Lb.
F.o.b. Pittsburgh or Cleveland	$2.75
F.o.b. Chicago	2.85

Small Rivets

(7/16-In. and Smaller)

	Per Cent Off List
F.o.b. Pittsburgh	70, 10 and 5
F.o.b. Cleveland	70, 10 and 5 to 70 and 10
F.o.b. Chicago	70, 10 and 5 to 70 and 10

Cap and Set Screws

(Freight allowed up to but not exceeding 50c. per 100 lb. on lots of 200 lb. or more)

	Per Cent Off List
Milled cap screws	80, 10 and 10
Milled standard set screws, case hardened	80 and 10
Milled headless set screws, cut thread	80
Upset hex. head cap screws, U.S.S. thread	85 and 5
Upset hex. cap screws, S.A.E. thread	85 and 5
Upset set screws	80, 10 and 10
Milled studs	70 and 5

Chicago

Backlogs Shrink But Steel Output Holds at 90 Per Cent—Nails Weaker

CHICAGO, May 17.—Deliveries of plates and shapes, and to some extent soft steel bars, have improved, and buyers have been quick to take advantage of the opportunity to reduce inventories and to order in smaller lots and at more frequent intervals. Service of that kind, which borders on that expected from warehouses, is not to the liking of producers, who foresee higher mill costs. Ruling prices on plates and shapes are now 2c., Chicago, but bars, the demand for which is active, still command 2c. to 2.10c. Although backlogs are noticeably smaller, ingot production holds steady at not far from 90 per cent of capacity.

Spring trade in wire products is holding up well, though not without price concessions of $1 on plain wire nails and as much as $2 on coated nails to purchasers of round tonnages. Several railroads operating eastward from Chicago have found fall rail commitments insufficient to meet requirements and have placed fresh orders with Chicago mills for 10,000 tons. Specifications for track accessories are in larger volume, and shipments are now being forwarded at the rate of 70 per cent of capacity.

Pig Iron.—Reports are insistent that about 4000 tons of foundry iron is being loaded at a Lake Erie port for shipment to Chicago by boat. On the whole, this market is quiet. Melters are taking iron at a steady rate against old commitments, but outside of a few scattered inquiries for third quarter there is a general lack of interest in requirements beyond July 1. A foundry in western Michigan is in the market for 600 tons for delivery in July and August, and a Chicago melter will buy 250 tons of iron carrying 2.25 per cent, and over, silicon for prompt delivery. New freight rates to points east of Chicago are scheduled to go into effect late this month. In some cases the freight differential will be lower between Cleveland and Chicago. To Muskegon, Mich., the contemplated rates are $3 from Chicago and $4 from Cleveland. The present rates are $3.02 and $4.41, respectively, or a reduction in the differential from $1.39 to $1. An inquiry is in the market for 500 tons of 14 to 15 per cent grade Bessemer ferrosilicon.

Prices per gross ton at Chicago:

Northern No. 2 foundry, sil. 1.75 to 2.25	$20.00
N'th'n No. 1 fdy., sil. 2.25 to 2.75	20.50
Malleable, not over 2.25 sil.	20.00
High phosphorus	20.00
Lake Superior charcoal, averaging sil. 1.50	27.04
Southern No. 2 fdy. (all rail)	24.01
Southern No. 2 (barge and rail)	22.18
Low phos., sil. 1 to 2 per cent, copper free	$31.50 to 32.00
Silvery, sil. 8 per cent	33.29
Bessemer ferrosilicon, 14 to 15 per cent	46.79

Prices are delivered at consumers' yards except on Northern foundry, high phosphorus and malleable, which are f.o.b. local furnace, not including an average switching charge of 61c. per gross ton.

Ferroalloys.—Foreign spiegeleisen is being offered freely for both prompt and future delivery at $35, New Orleans, or $42.56, delivered Chicago. Domestic material is quoted at $43.76, delivered Chicago, but little is available for immediate shipment. A number of small and medium-sized users of ferromanganese have contracted for second quarter requirements at $95, seaboard, or $102.56, delivered, with protection against a price reduction guaranteed by the sellers.

Prices delivered Chicago: 80 per cent ferromanganese, $102.56; 50 per cent ferrosilicon, $85 to $87.50; spiegeleisen, 18 to 22 per cent, $42.56 to $43.76.

Coke.—The demand is steady, and prices of by-product foundry coke are unchanged.

Bolts, Nuts and Rivets.—Specifications for bolts and nuts are larger in the aggregate, largely as the result of heavier requirements by the railroads. Spot buying is dull, but prices on such business as is going are well maintained. Orders for small rivets are in good volume, and prices are showing greater strength.

Plates.—About one-half of the 3500 freight and 175 passenger cars, requiring upward of 40,000 tons of steel, recently purchased by the New York Central, may be built in shops that are tributary to Chicago mills. Bids on 4500 freight cars for the Illinois Central were received May 14, and it is generally believed that prompt action will be taken in making awards. The Chicago & Illinois Midland has placed repairs for 240 coal cars with the Ryan Car Co. and has ordered six passenger cars from the Pullman Car & Mfg. Corporation. That railroad still has an inquiry in the market for 250 hopper cars. The Fruit Growers' Express has ordered 300 underframes from the Ryan Car Co., this being a partial purchase against an inquiry for 651 underframes reported in THE IRON AGE of May 5. Plate tonnage coming from the general manufacturing trade, makers of small tanks and fabricators, is steady, but mills are feeling the sudden stoppage of orders from oil refiners and producers. Reports concerning the efforts to control the production of crude oil are at variance, and in some quarters it is believed that pending tank programs are not yet dead and may be revived in 30 to 45 days. The Standard Oil Co. of Indiana contemplates the erection of a 1000-bbl. per day refinery at Saginaw, Mich. This is said to be the first expansion, except at existing plants, undertaken by that company in 20 years. About 2000 tons of plates will be required for storage tanks, and an additional tonnage will be needed for stills and work around the productive units of the new refinery. Mill prices on plates are steady at 2c., Chicago. Some small and undesirable lots are going at 2.10c. when buyers do not invite competition.

Mill prices on plates per lb.: 2c., Chicago.

Structural Material.—Building awards in the Chicago district continue to run behind those of last year in spite of the fact that building permits are larger than in 1926. Architects are busy, but there appears to be a tightening of loans for construction purposes, and, in view of the fact, fabricators are inclined to consider a number of projects that came out early in the year as no longer active. Large shops are not far from being fully engaged, but their backlogs are smaller than in April. Small fabricators are less fortunately situated, with operations at 60 per cent of capacity, or less, and contracts lighter than at the turn of the month. The Milwaukee Bridge Co. has taken 600 tons for an industrial building for the Ajax Rubber Co., Racine, Wis., and the Texas & Pacific has awarded 500 tons of miscellaneous bridge work to the Virginia Bridge & Iron Co. The Roosevelt Road bridge across the Chicago River calls for 2000 tons. Specifications for plain material from fabricators are lighter, and competition for going business is keen, with the result that mill prices of 2.10c., Chicago, have practically disappeared, 2c. now being the common quotation.

Mill prices on plain material per lb.: 2c., Chicago.

Bars.—Specifications for soft steel bars are holding steady and are equal to shipments. New buying has increased and again is equal to mill output, which stands at 90 per cent of capacity, or better. Tractor plants continue at high rate of operation, and further evidence is given this week of a larger demand for farm machinery. American manufacturers of farm implements are making a strong bid for foreign trade with some degree of success. Specifications from bolt and rivet makers are steady, and manufacturers of cold-drawn bars are entering liberal orders at the mills. The automotive trade shows little or no change, gains in one section being offset by losses at other points. Automobile accessory manufacturers are busy and report greater activity on the part of jobbers. Prices for soft steel bars are unchanged at 2c. to 2.10c., Chicago. Specifications for iron bars are in fair volume, and such new business as is coming out is being taken at 2c., Chicago. The demand for alloy steel bars holds steady, and prices are firm. Dealers trading in reinforcing bars are the largest users of rail steel bars at the present time. Orders from the bed trade are of small aggregate tonnage, and the seasonal pickup expected at this time of the year has failed to materialize. On the other hand, manufacturers of barn equipment are experiencing a heavier business than is customary in the fifth month of the year. Rail

steel mills are able to make prompt shipment both on orders entered for rolling and from stocks. Prices range from 1.90c. to 2c., Chicago, with the bulk of business being taken at the lower figure.

Mill prices per lb.: Soft steel bars, 2c. to 2.10c., Chicago; common bar iron, 2c., Chicago; rail steel bars, 1.90c. to 2c., Chicago.

Reinforcing Bars.—From the viewpoint of large awards the week has been unusually quiet, but contracts for less than 100 tons each have been fairly numerous. Architects are busy, and dealers are unable to keep up with requests for estimates. Inquiry is in large volume. Among the more active new projects in Chicago are the Ribach Building, calling for 900 tons of rail and billet bars, and the Meles Hotel, which will take 400 tons. With shops fairly well engaged and with the prospect of a substantial tonnage being let soon, prices are firmer, 2.30c. being the minimum for billet steel bars out of Chicago warehouse and 2.10c. representing the bottom of the market for rail steel reinforcing bars. Awards and new projects are shown on page 1487.

Rails and Track Supplies.—Two Eastern railroads with terminals in Chicago have made additional purchases of standard-section rails amounting to 10,000 tons. Specifications for rails are coming in more liberally, and Chicago mill operations are holding to 80 per cent of capacity.

Prices f.o.b. mill, per gross ton: Standard-section open-hearth and Bessemer rails, $43; light rails, rolled from billets, $36 to $38. *Per Lb.:* Standard railroad spikes, 2.90c.; track bolts with square nuts, 3.90c.; steel tie plates, 2.35c.; angle bars, 2.75c.

Wire Products.—Competition for desirable nail business is bringing out concessions of $1 a ton on plain wire nails, and in some cases $2 a ton on the cement coated product. Many orders of ordinary size, however, are being taken at $2.60, base per keg, Chicago. Low stocks in the hands of jobbers are believed by some to be the reason for the continuance to this date of a substantial spring demand. Mill stocks are now complete in all lines, and the operations of some departments have been stepped up to more evenly balance stocks against demand. Some improvement is noted in business from the South. The high water has receded in some parts of the Mississippi Valley, and farmers are getting into their fields. At Memphis, Tenn., the water level has dropped 10 ft. from flood stage.

Cast Iron Pipe.—The market is showing more life, but manufacturers still have low spots on their books and prices lack strength at $35 to $36, base Birmingham, or $43.20 to $44.20, delivered Chicago. The aggregate of inquiries from small municipalities is large, and public utilities are showing greater interest in their pipe requirements. Several sizable orders have been placed by gas companies in the West. James B. Clow & Sons have taken 425 tons of 6-in. and a like tonnage of 8-in., all Class B pipe, for Royal Oak, Mich., at $42.25, delivered, or $34.30, base Birmingham. Park Ridge, Ill., is said to have placed 360 tons of 6-in., 145 tons of 8-in., and 210 tons of 12-in., all Class B pipe, with the United States Cast Iron Pipe & Foundry Co. Manitowoc, Wis., has awarded 400 tons of 6 and 12-in. pipe to the United States company. At Detroit the low bid on 3000 tons of 36-in. pipe is said to have been made by sellers of French pipe. Fresh inquiry includes 3600 tons of 12-in. and 3800 tons of 16-in. for Detroit, 250 tons of 6, 8, and 12-in. pipe for Royal Oak, Mich., 200 tons of 3-in. to 24-in. fittings for Chicago, and 100 tons of 6 to 8-in. Class B pipe for Metamora, Ohio.

Prices per net ton, delivered Chicago: Water pipe, 6-in. and over, $43.20 to $44.20; 4-in., $47.20 to $48.20; Class A and gas pipe, $4 extra.

Sheets.—New prices announced by producers of sheets last week are holding for such business as is being taken, but orders are small and no real test is looked for before the early part of June. Users are holding stocks to the minimum and do not appear to be deterred from placing small and frequent orders at the new prices. The demand for blue annealed sheets holds up well, with the ruling price relatively strong at 2.40c., Chicago. Manufacturers of portable and sheet-metal houses are taking out larger tonnages in anticipation of a substantial demand for their products where floods have swept away permanent dwellings.

Prices per lb., delivered from mill in Chicago: No. 24 black, 3.15c.; No. 24 galvanized, 4c.; No. 10 blue annealed, 2.40c. Delivered prices at other Western points are equal to the freight from Gary plus the mill prices, which are 5c. per 100 lb. lower than the Chicago delivered prices.

Old Material.—The market is at a standstill. Prices are nominal and lean decidedly toward the weaker side when a sale is in prospect. As a general rule, users have what might be termed fair stocks, and though the melt holds up well, there is a general tendency to refrain from making further commitments for fear that business may recede in June. Buyers of heavy melting are out of the market and are accepting fewer shipments. Dealer trading has been less active, even at the level of $12.50 per gross ton, delivered.

Prices delivered consumers' yards, Chicago:

Per Gross Ton

Basic Open-Hearth Grades	
Heavy melting steel	$12.25 to $12.75
Shoveling steel	12.25 to 12.75
Frogs, switches and guards, cut apart, and miscellaneous rails	14.00 to 14.50
Hydraulic compressed sheets	10.75 to 11.25
Drop forge flashings	9.50 to 10.00
Acid Open-Hearth Grades	
Forged, cast and rolled steel car-wheels	15.00 to 15.50
Railroad tires, charging box size	15.25 to 15.75
Railroad leaf springs, cut apart	15.25 to 15.75
Steel couplers and knuckles	15.00 to 15.50
Coil springs	15.50 to 16.00
Low phosphorus punchings	14.75 to 15.25
Electric Furnace Grades	
Axle turnings	12.00 to 12.50
Blast Furnace Grades	
Axle turnings	10.50 to 11.00
Cast iron borings	10.00 to 10.50
Short shoveling turnings	10.00 to 10.50
Machine shop turnings	7.25 to 7.75
Rolling Mill Grades	
Iron rails	13.50 to 14.00
Rerolling rails	15.25 to 15.75
Cupola Grades	
Steel rails, less than 3 ft	16.00 to 16.50
Angle bars, steel	14.00 to 14.50
Cast iron carwheels	14.25 to 14.75
Malleable Grades	
Railroad	14.75 to 15.25
Agricultural	14.25 to 14.75
Miscellaneous	
*Relaying rails, 56 to 60 lb	25.50 to 26.50
*Relaying rails, 65 lb. and heavier	26.00 to 31.00

Per Net Ton

Rolling Mill Grades	
Iron angle and splice bars	14.00 to 14.50
Iron arch bars and transoms	18.50 to 19.00
Iron car axles	21.00 to 21.50
Steel car axles	17.50 to 18.00
No. 1 railroad wrought	11.50 to 12.00
No. 2 railroad wrought	10.75 to 11.25
No. 1 busheling	9.50 to 10.00
No. 2 busheling	6.25 to 6.75
Locomotive tires, smooth	15.25 to 15.75
Pipes and flues	7.50 to 8.00
Cupola Grades	
No. 1 machinery cast	16.00 to 16.50
No. 1 railroad cast	15.00 to 15.50
No. 1 agricultural cast	14.75 to 15.25
Stove plate	12.75 to 13.25
Grate bars	12.00 to 12.50
Brake shoes	11.00 to 11.50

*Relaying rails, including angle bars to match, are quoted f.o.b. dealers' yards.

Warehouse Prices, f.o.b. Chicago

	Base per Lb.
Plates and structural shapes	3.10c.
Soft steel bars	3.00c.
Reinforcing bars, billet steel	2.30c. to 2.75c.
Cold-finished steel bars and shafting—	
Rounds and hexagons	3.60c.
Flats and squares	4.10c.
Bands	3.65c.
Hoops	4.15c.
Black sheets (No. 24)	3.95c.
Galvanized sheets (No. 24)	4.80c.
Blue annealed sheets (No. 10)	3.50c.
Spikes, standard railroad	3.55c.
Track bolts	4.55c.
Rivets, structural	3.60c.
Rivets, boiler	3.60c.
	Per Cent Off List
Machine bolts	60
Carriage bolts	60
Coach or lag screws	60
Hot-pressed nuts, squares, tapped or blank	60
Hot-pressed nuts, hexagons, tapped or blank	60
No. 8 black annealed wire, per 100 lb	$3.20
Common wire nails, base per keg	$2.85 to 2.95
Cement coated nails, base per keg	2.95

New York

Large Railroad Equipment Purchases—6000 Tons of Cast Pipe Placed

NEW YORK, May 17.—Sales of pig iron by local brokers during the week totaled about 7000 tons. Of this amount 150 tons was charcoal iron and several hundred tons was for shipment out of this district. Current buying is limited almost entirely to small tonnages for prompt and June deliveries. Little interest is being manifested in iron for third quarter shipment; in fact, the market is entirely devoid of sizable inquiries. Foundry operations are spotty, with some melters holding up deliveries with the likelihood that they will carry considerable iron now on order into the third quarter. Releases from other consumers, however, have tended to offset these suspensions, although not entirely. In view of the dull condition of the market and the lack of attractive inquiries, prices remain largely untested. Competition for business in this territory is not so sharp as in New England, where the observance of a Buffalo base by nearby furnaces has been virtually abandoned.

Prices per gross ton, delivered New York district:

Buffalo No. 2 fdy., sil. 1.75 to 2.25 (all rail)	$22.41
No. 2 plain fdy. (by barge, del'd alongside in lighterage limits N. Y. and Brooklyn)	$20.00 to 20.50
East. Pa. No. 2 fdy., sil. 1.75 to 2.25	21.89 to 23.02
East. Pa. No. 2X fdy., sil. 2.25 to 2.75	22.39 to 23.52
East. Pa. No. 1X fdy., sil. 2.75 to 3.25	22.89 to 24.02
No. 2 Virginia fdy., sil. 1.75 to 2.25	27.04

Freight rates: $4.91 from Buffalo, $1.39 to $2.52 from eastern Pennsylvania, $5.54 from Virginia.

Ferroalloys.—One seller reports a continuance of fairly liberal contracting of ferromanganese for the second half, while others state they have done very little for that delivery. Prices are unchanged at $95, seaboard basis. There has been a little business in carload and small lots. The spiegeleisen market is equally inactive and prices are unchanged at $36 to $37 for the higher grade, although some distress imported alloy is said to have gone at $35, Hazzard basis. Specifications on contract for ferromanganese, spiegeleisen, ferrosilicon and ferrochromium are reported good.

Reinforcing Bars.—The reduction in mill price on concrete reinforcing bars, announced last week, has done little to improve business. The volume of small orders has increased slightly, but larger jobs are slow in being placed. A factory building in Jersey City on which estimates are being prepared will require 500 tons of bars. Prices are unchanged.

Prices per lb. on billet steel reinforcing bars: From mill, 1.90c., Pittsburgh. Out of New York warehouse, 3.15c., delivered at job. Out of Youngstown warehouse, 2.50c., Youngstown, or 2.87½c., delivered New York.

Finished Material.—The market is characterized by a scarcity of new business, coupled with a more determined stand on the part of makers to maintain new price levels on such products as sheets and strips. The week has seen definite reduction on wire nails and galvanized barbed wire, but not all the mills represented in this territory have formally met this reduction which amounts to $1 a ton. Plain wire nails and cement coated nails are now quoted at 2.50c., Pittsburgh and Cleveland, and galvanized barbed wire at 3.20c. Some makers of sheets and strips have opened their books for third quarter at the recently advanced prices, that is 3c., Pittsburgh, for black sheets, 3.85c. for galvanized, and 2.25c. for blue annealed sheets, 2.10c. to 2.30c. for hot-rolled strip and 3c. to 3.25c. on cold rolled strip. On sheets and strips little new business has been taken since the advance, but the market seems stronger than was the case a week ago. Prospects of an early settlement of the plumbers' strike in Brooklyn have given the market for butt-weld pipe a better outlook, but the volume of new orders coming in at this time is nothing more than fair. Business on both lap-weld and butt-weld is being conducted on a strictly hand-to-mouth basis, and some of the jobbers in this territory are offering concessions in the form of larger discounts. Structural lettings thus far in the month have been at a fair rate, but most business has been taken at price concessions. The New York Central Railroad has placed its orders for cars and locomotives.

Mill prices per lb. delivered New York: Soft steel bars, 2.19c. to 2.24c.; plates, 2.14c. to 2.24c.; structural shapes, 2.09c. to 2.24c.; bar iron, 2.14c. to 2.24c.

Warehouse Business.—There is a good volume of buying from stock, and at the present rate May will be the best month since the first of the year. Prices are generally firm with the exception of offerings of black and galvanized sheets at slightly less than the market. These instances, however, are isolated, the greater part of current business being on the basis of 4.20c. per lb., base, for black and 4.95c. per lb., base, for galvanized. Demand for structural steel continues fair.

Warehouse Prices, f.o.b. New York

	Base per Lb.
Plates and structural shapes	3.34c.
Soft steel bars and small shapes	3.24c.
Iron bars	3.24c.
Iron bars, Swedish charcoal	7.00c. to 7.25c.
Cold-finished steel shafting and screw stock—	
Rounds and hexagons	4.00c.
Flats and squares	4.50c.
Cold-rolled strip, soft and quarter hard	5.75c.
Hoops	4.49c.
Bands	3.99c.
Blue annealed sheets (No. 10 gage)	3.89c.
Long terne sheets (No. 24 gage)	5.80c.
Standard tool steel	12.00c.
Wire, black annealed	4.50c.
Wire, galvanized annealed	5.15c.
Tire steel, 1½ x ½ in. and larger	3.30c.
Smooth finish, 1 to 2½ x ¼ in. and larger	3.65c.
Open-hearth spring steel, bases	4.50c. to 7.00c.

Machine bolts, cut thread:	Per Cent Off List
¾ x 6 in. and smaller	50 to 50 and 10
1 x 30 in. and smaller	45 to 50
Carriage bolts, cut thread:	
½ x 6 in. and smaller	50 and 10
¾ x 20 in. and smaller	50
Coach screws:	
½ x 6 in. and smaller	50 and 10
1 x 16 in. and smaller	50

Boiler Tubes—	Per 100 Ft.
Lap welded steel, 2-in.	$17.33
Seamless steel, 2-in.	20.24
Charcoal iron, 2-in.	25.00
Charcoal iron, 4-in.	67.00

Discounts on Welded Pipe

Standard Steel—	Black	Galv.
½-in. butt	46	29
¾-in. butt	51	37
⅞-in. butt	53	39
2½-6-in. lap	48	35
7 and 8-in. lap	44	17
11 and 12-in. lap	37	12
Wrought Iron—		
½-in. butt	4	+19
¾-in. butt	11	+ 9
1-1½-in. butt	14	+ 6
2-in. lap	5	+14
3-6-in. lap	11	+ 6
7-12-in. lap	3	+16

Tin Plate (14 x 20 in.)

	Prime	Seconds
Coke, 100 lb. base box	$6.45	$6.20
Charcoal, per box—	A	AAA
IC	$9.70	$12.10
IX	12.00	14.25
IXX	13.90	16.00

Terne Plate (14 x 20 in.)

IC—20-lb. coating	$10.00 to $11.00
IC—30-lb. coating	12.00 to 13.00
IC—40-lb. coating	13.75 to 14.25

Sheets, Box Annealed—Black, C. R. One Pass

	Per Lb.
Nos. 18 to 20	4.00c.
No. 22	4.15c.
No. 24	4.20c.
No. 26	4.30c.
No. 28*	4.45c.
No 30	4.70c.

Sheets, Galvanized

	Per Lb.
No. 14	4.35c. to 4.60c.
No. 16	4.45c. to 4.70c.
No. 18	4.60c.
No. 20	4.75c.
No. 22	4.80c.
No. 24	4.95c.
No. 26	5.20c.
No. 28*	5.45c.
No. 30	5.85c.

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

Coke.—Demand is irregular. Some sellers report increased inquiry, while others find the volume of buying about the same as during the past month or more. Prices are unchanged and evidently slightly firmer. Standard foundry coke continues at $4.50 to $5 per ton, Connellsville, and furnace grade at $3.25 to $3.75 per ton, Connellsville. Furnace coke for delivery into next year is understood to have been quoted at $3.85 per ton. Delivered prices for Connellsville foundry coke are: To northern New Jersey, $8.53 to $9.03; New York or Brooklyn, $9.29 to $9.79; Newark or Jersey City, N. J., $8.41 to $8.91 per ton. By-product foundry coke is unchanged at $9.59 to $10.77 per net ton, delivered Newark or Jersey City, N. J.

Cast Iron Pipe.—Current purchasing is principally of small lots to fill in on existing contracts. Pending business includes the tonnage of pipe for Rochester, N. Y., and the 1500 tons, mostly 24-in. pipe, for Baranquilla, Colombia. Low prices are still being quoted by some Southern makers, and on desirable tonnages competition is keen. The 6000 tons of pipe for Syracuse, N. Y., has been awarded to the United States Cast Iron Pipe & Foundry Co.

Prices per net ton, delivered New York: Water pipe, 6-in. and larger, $45.60 to $47.60; 4-in. and 5-in., $50.60 to $52.60; 3-in., $60.60 to $62.60; Class A and gas pipe, $5 extra.

Old Material.—The downward movement of prices on all grades continues. No. 1 heavy melting steel is still being purchased at $14 per ton, delivered eastern Pennsylvania, with shipments going forward to Bethlehem, Coatesville and Conshohocken, Pa., and Claymont, Del. While the Claymont, Del., consumer recently contracted at $14.50 per ton, delivered, $14 per ton is understood to be the best price at which this mill is now willing to buy. The high bid on the heavy melting steel in the Pennsylvania Railroad tonnage is reported to have been $14.67 per ton, delivered Steelton, Pa., with the rails at 50c. less, or $14.17 per ton, delivered to the same plant. Borings and turnings are now being purchased at $10.50 per ton, delivered Swedeland, Pa. Dealers are offering about $11.50 per ton, delivered, as the maximum buying price for yard steel. Foreign buyers are still negotiating for yard grade of heavy melting steel, and $11 per ton, f.a.s. New York, is understood to have been offered for about 10,000 tons. Difficulty in securing such a large tonnage to concentrate for shipment has been an obstacle to closing the business.

Dealers' buying prices per gross ton, New York:

No. 1 heavy melting steel	$10.25 to $11.35
Heavy melting steel (yard)	7.75 to 8.00
No. 1 heavy breakable cast	11.25 to 11.75
Stove plate (steel works)	8.00 to 8.50
Locomotive grate bars	9.00 to 9.50
Machine shop turnings	7.00 to 7.75
Cast borings (blast furnace or steel works)	7.50 to 7.75
Mixed borings and turnings	7.50 to 8.00
Steel car axles	15.50 to 16.00
Iron car axles	23.00 to 23.50
Iron and steel pipe (1 in. diam., not under 2 ft. long)	9.25
Forge fire (nom.)	8.00 to 8.50
No. 1 railroad wrought	12.50 to 13.00
No. 1 yard wrought, long	11.50 to 12.00
Rails for rolling	11.50 to 12.00
Cast iron carwheels	11.00 to 11.50
Stove plate (foundry)	9.75 to 10.00
Malleable cast (railroad)	11.25 to 11.75
Cast borings (chemical)	12.50 to 13.00

Prices per gross ton, delivered local foundries:

No. 1 machinery cast	$15.00 to $15.50
No. 1 heavy cast (columns, building materials, etc.), cupola size	13.50 to 14.00
No. 2 cast (radiators, cast boilers, etc.)	12.50 to 13.00

Further Weakness in Detroit Scrap

DETROIT, May 17.—Further weakness has been registered in scrap in this district, and the market generally has no firming factors. No sales involving any tonnage have been recorded, although there is a possibility that one or two orders have been placed quietly.

	Per Gross Ton
Heavy melting and shoveling steel	$12.50 to $13.00
Borings and short turnings	8.25 to 8.75
Long turnings	7.50 to 8.00
No. 1 machinery cast	17.00 to 18.00
Automobile cast	19.00 to 20.00
Hydraulic compressed	11.00 to 11.50
Stove plate	13.50 to 14.50
No. 1 busheling	10.50 to 11.00
Sheet clipping	8.00 to 8.50
Flashings	10.50 to 11.00

Cleveland

Volume of New Business in Steel Undiminished—Scrap Lower

CLEVELAND, May 17.—New business in finished steel is holding at about recent volume. While shipments by some of the mills are in excess of sales and specifications against contracts, they still have a backlog of orders. Business in the aggregate is larger than during May last year. Operations of some of the consuming plants in this territory have slowed down somewhat, a fact reflected in the size of orders. Reports from the automotive industry indicate a slight decrease in the output, apparently showing that the peak in spring production has been passed. However, several of the motor car builders are still maintaining their recent output.

Some new business is coming from the automotive industry, but not in large lots, as the car manufacturers are well covered for the remainder of the quarter. Nails and wire, which have been dragging in this market all spring, are now moving well. The demand for plates is rather slow. Some tonnage is being placed for oil refinery work. The Lima Locomotive Works, Inc., will place a round lot for 25 locomotives, which it has been awarded by the Erie Railroad.

In the structural field not a great deal of new work is coming out in the immediate territory. In the surrounding territories most of the activity is in eastern New York, where considerable work is being placed and is in prospect.

On steel bars there is a range of 1.85c. to 1.90c., Pittsburgh, in quotations in this district by outside mills. Small-lot sales are being made at a higher price, but some producers are naming a lower price for good lots. Cleveland mills are quoting the same price range, f.o.b. Cleveland.

While an occasional $1 a ton concession is reported on plates, the market is holding quite steadily at 1.90c., Pittsburgh. Structural material is firm at 1.90c., Pittsburgh. Some of the mills have formally reduced wire nails 5c. a keg to $2.50, which has recently been a rather common price, and one has marked staples and barbed wire down $1 a ton. Plain wire is firm at $2.40, Cleveland and Pittsburgh.

Pig Iron.—Some activity developed in Indiana and southern Ohio during the week, but sales were light in other districts in which Cleveland producers find a market. A Hamilton, Ohio, consumer bought 4500 tons of malleable iron for plants in Hamilton and in Indiana, considerable of this iron going to Lake furnaces. An eastern Indiana consumer purchased 1700 tons of foundry iron from two Lake furnaces, and another Indiana melter bought 1000 tons from a Cleveland furnace. Some consumers are taking a little more interest in the third quarter, and most of the iron covered by the sales noted above was for that delivery, although a little of it was to fill out the present quarter. However, an active buying movement for the third quarter is not looked for before the middle of June. Some foundries bought rather heavily for the present quarter and will carry considerable iron over to the next quarter. Third quarter sales are being made at the ruling prices for the present quarter. The iron sold by Cleveland producers was taken at $18, furnace, their present price for delivery to points where they have a freight disadvantage. Other Lake Erie makers

Warehouse Prices, f.o.b. Cleveland

	Base per Lb.
Plates and structural shapes	3.00c.
Soft steel bars	3.00c.
Reinforcing steel bars	2.75c. to 3.00c.
Cold-finished rounds and hexagons	3.65c.
Cold-finished flats and squares	4.15c.
Hoops and bands	3.65c.
Cold-rolled strip	*5.95c.
Black sheets (No. 24)	3.65c.
Galvanized sheets (No. 24)	4.50c.
Blue annealed sheets (No. 10)	3.25c.
No. 9 annealed wire, per 100 lb	$2.90
No. 9 galvanized wire, per 100 lb	3.35
Common wire nails, base, per keg	2.90

*Net base, including boxing and cutting to length.

quote a range of from $18.50 to $19, furnace. Local producers continue to quote $18.50, furnace, for delivery in the Cleveland territory and $19, furnace, for Cleveland delivery. The Valley market on foundry is firm at $18.50, furnace. In Michigan prices are unchanged at $19.50, furnace. While shipping orders are fair, they are not so heavy as during April.

Prices per gross ton at Cleveland:

N'th'n No. 2 fdy., sil. 1.75 to 2.25.	$19.50
Southern fdy., sil. 1.75 to 2.25...	24.00
Malleable	19.50
Ohio silvery, 8 per cent.....	31.50
Basic, Valley furnace.....$18.00 to	18.50
Standard low phos., Valley fur.. 27.50 to	28.00

Prices, except on basic and low phosphorus, are delivered Cleveland. Freight rates: 50c. from local furnaces; $3 from Jackson, Ohio; $6 from Birmingham.

Fluorspar.—In spite of a reported concession of $1 a ton, leading producers are holding to $18 per net ton, mines, for gravel fluorspar, and a Cleveland consumer purchased 500 tons at that price during the week.

Iron Ore.—Some sales in small lots are being made, but the market does not show much life. Many buyers who expect to need additional ore see no hurry in placing contracts.

Bolts, Nuts and Rivets.—New demand for bolts and nuts is slow, and business during May is not holding up to the volume of April, when manufacturers had a good backlog of specifications against first quarter contracts. Orders are confined to small lots. The present prices have not yet been given much of a test. Bolt and nut manufacturers are not operating at over 60 per cent of capacity. Rivet business is rather light, being confined to small lots and specifications against contracts.

Semi-Finished Steel.—Specifications against contracts are fair, but there is virtually no new business and little activity is expected until consumers begin to buy for the third quarter. A local mill is making shipments on the basis of $34, Cleveland and Youngstown, for sheet bars and $33 for large billets and slabs.

Sheets.—While the larger producers are holding firm to the new prices of 3c., Pittsburgh, for black sheets, 2.25c. for blue annealed and 3.85c. for galvanized, some of the smaller mills are still naming the prices that were in effect a few weeks ago, as is indicated by the appearance during the week of quotations of 2.80c., Pittsburgh, on black and 2.10c. on blue annealed. Some small-lot business is being taken at the present regular prices, but most consumers are covered for the remainder of the quarter. Automobile body sheets appear to be holding firmly at the new price of 4.25c.

Strip Steel.—Some of the independent mills have opened their books for hot-rolled strip for the third quarter at the present prices of 2.10c., Pittsburgh, for wide material and 2.30c. for narrow. Buying for the coming quarter will bring a test of prices, as consumers generally covered for the remainder of this quarter before the recent price advance. Specifications are rather light and not equal to shipments. There is little new demand for cold-rolled strip. Mills appear to be holding to the new prices based on quantity differentials and ranging from 3c. to 3.25c., Cleveland.

Ore Consumption.—The consumption of Lake Superior ore during April was 5,018,834 gross tons, a decrease of 12,362 tons from March and comparing with 5,191,690 tons in April last year. Ore in furnace yards and on docks May 1 amounted to 20,752,613 tons, as compared with 17,707,886 tons on May 1 last year. There were 186 furnaces in blast using Lake ore on April 30, or the same number as at the end of the previous month.

Reinforcing Bars.—Several Cleveland projects requiring round lots are still pending. Some of the prices that are being named indicate a keenly competitive condition locally. Rail steel bars range from 1.70c. to 1.80c., mill.

Warehouse Business.—While sales are fair, the volume with some jobbers is hardly up to that in April. Some shading is reported on sheets, but prices on other warehouse products are firm.

Old Material.—The supply of scrap is in excess of the present demand, and this is tending to further depress prices. Heavy melting steel and blast furnace scrap declined 25c. a ton during the week. Activity is confined to a limited demand by dealers to fill old orders. Heavy melting steel during the week brought $13.50 for Cleveland delivery and $15.25 for Youngstown delivery. Dealers were able to buy blast furnace scrap in Cleveland at as low as $10. Some brought $12 for Canton delivery. The local production of this grade is in excess of the present local demand, and the price is getting down close to what dealers can pay for the material for outside shipment. Some Detroit scrap is starting to move by water to Buffalo, which absorbed a considerable tonnage of Detroit scrap last year. Two cargo shipments are reported so far this season, aggregating 7000 tons.

Prices per gross ton, delivered consumers' yards:

Basic Open-Hearth Grades	
No. 1 heavy melting steel.....$13.50 to	$13.75
No. 2 heavy melting steel..... 13.00 to	13.25
Compressed sheet steel..... 13.00 to	13.25
Light bundled sheet stampings... 12.00 to	12.50
Drop forge flashings..... 12.50 to	13.00
Machine shop turnings..... 9.00 to	9.25
No. 1 railroad wrought..... 11.50 to	12.00
No. 2 railroad wrought..... 13.75 to	14.00
No. 1 busheling..... 11.50 to	11.75
Pipes and flues..... 10.00 to	10.50
Steel axle turnings..... 12.50 to	13.00
Acid Open-Hearth Grades	
Low phosphorus forging crops... 16.50 to	17.00
Low phosphorus, billet bloom and slab crops ..... 17.00 to	17.50
Low phosphorus sheet bar crops. 16.00 to	16.50
Low phosphorus plate scrap..... 16.00 to	16.50
Blast Furnace Grades	
Cast iron borings..... 10.25 to	10.50
Mixed borings and short turnings 10.25 to	10.50
No. 2 busheling..... 10.25 to	10.50
Cupola Grades	
No. 1 cast..... 16.50 to	17.00
Railroad grate bars..... 12.00 to	12.50
Stove plate ..... 12.00 to	12.50
Rails under 3 ft..... 18.00 to	18.50
Miscellaneous	
Railroad malleable ..... 15.50 to	16.00
Rails for rolling..... 16.25 to	16.50

Philadelphia

Large Sales of Heavy Melting Steel Fail to Strengthen Scrap

PHILADELPHIA, May 17.—Sales of heavy melting steel scrap to two Eastern steel companies, totaling about 65,000 tons, failed to strengthen the scrap market, which has been notably dull and weak for months. One company took about 50,000 tons and the other 15,000 tons, most of which was sold at $14.50, delivered. In other branches of the market there is extreme dullness, which is most marked in pig iron, but the steel trade is dragging and there is on every hand the report of a declining volume of sales this month. Representatives of sheet manufacturers are deriving the most satisfaction from the present situation, not that sales are large at the new prices an-

Warehouse Prices, f.o.b. Philadelphia

	Base per Lb.
Plates, ¼-in. and heavier.....	2.80c. to 3.00c.
Plates, ⅜-in.	3.00c. to 3.20c.
Structural shapes	2.65c. to 3.00c.
Soft steel bars, small shapes and iron bars (except bands).....	2.70c. to 3.20c.
Round-edge iron	3.50c.
Round-edge steel, iron finished, 1½ x 1½ in.....	3.50c.
Round-edge steel, planished.....	4.30c.
Reinforcing steel bars, square, twisted and deformed.....	3.00c.
Cold-finished steel, rounds and hexagons	4.00c.
Cold-finished steel, squares and flats	4.50c.
Steel hoops	3.85c. to 4.15c.
Steel bands, No. 12 gage to ⅛-in., inclusive	3.60c. to 3.90c.
Spring steel	5.00c.
Black sheets (No. 24).....	4.35c.
Galvanized sheets (No. 24).....	5.20c.
Blue annealed sheets (No. 10)...	3.30c.
Diamond pattern floor plates—	
¼-in.	5.30c.
⅜-in.	5.50c.
Rails	3.20c.
Swedish iron bars.....	6.60c.

nounced a few weeks ago, but because price cutting has disappeared and there is almost complete unanimity in holding to the higher schedule that recently went into effect. Sheet manufacturers do not hope to profit greatly by the advance until the third quarter, consumers and jobbers having being fairly well covered at the old prices for this month and next, but there is every indication now that the losses which the sheet mills are said to have suffered because of price demoralization have resulted in a general determination to put an end to unprofitable selling.

Pig Iron.—Sales of foundry and low phosphorus grades of pig iron have amounted to a few thousand tons in the week. Basic consumers are well covered, and there have been no sales of that grade. A canvass of the leading foundry iron consumers in the East by a pig iron selling firm discloses that nearly all users of importance have enough iron for this quarter and many are well supplied for the third quarter as well. Most of them bought more for second quarter than their business warranted, and there will be a sufficient carry-over to place the furnaces in a less advantageous selling position than they were at the beginning of this quarter. Such sales as have been made recently for third quarter delivery, and they are not many, have been at the current price level, namely $21, furnace, for the base grade, 1.75 to 2.25 per cent silicon. Notwithstanding the outlook for reduced consumption in third quarter, there is no price weakness. The No. 3 furnace of the Alan Wood Iron & Steel Co. will be blown out for relining on May 21.

Prices per gross ton at Philadelphia:

East. Pa. No. 2 plain, 1.75 to 2.25 sil.	$21.76 to $22.26
East. Pa. No. 2X, 2.25 to 2.75 sil.	22.26 to 22.76
East. Pa. No. 1X	22.76 to 23.26
Basic (delivered eastern Pa.)	20.75 to 21.25
Gray forge	21.00 to 21.50
Malleable	22.50 to 23.00
Standard low phos. (f.o.b. New York State furnace)	25.00
Copper bearing low phos. (f.o.b. furnace)	25.00 to 26.00
Virginia No. 2 plain, 1.75 to 2.25 sil.	26.67
Virginia No. 2X, 2.25 to 2.75 sil.	27.17

Prices, except on low phosphorus, are delivered Philadelphia. Freight rates: 76c. to $1.64 from eastern Pennsylvania furnaces; $5.17 from Virginia furnaces.

Billets.—Although ordinary rerolling billets are offered by mills in the Pittsburgh district at $33, Pittsburgh, Eastern mills, which cater mostly to users of special analysis steel, are holding for $34, base. There are few sales. Forging billets are quoted at $40, Pittsburgh.

Plates.—This month has brought a slight decline in the operations of Eastern plate mills, which are running at about 50 per cent. Orders are mostly for small lots for prompt shipment. Prices remain fairly steady at 1.85c. and 1.90c., Pittsburgh, but 1.80c. is quoted on some tonnages of more than ordinary size.

Structural Material.—Not only is there a falling off in orders received by the mills for plain material, but the amount of work that fabricators are being called upon to figure is exceedingly light. It is apparent that the peak of the spring building demand in this district has been passed. Prices quoted for shapes show no change. On lots of a carload the usual quotations are 1.80c. and 1.85c., Pittsburgh, but on larger lots concessions of $1 or $2 a ton are frequently offered.

Bars.—There is a slight decline in the number of orders for steel bars, and the quantities are usually small. Prompt deliveries are to be had from most of the mills, and consumers are taking advantage of this fact to keep their inventories close to actual requirements. Prices quoted are 1.85c. and 1.90c., Pittsburgh, the former price now applying quite generally on lots of a carload or more. The Truscon Steel Co. will furnish 2200 tons of concrete reinforcing bars for Philadelphia sewer work. Bar iron is quoted by Eastern mills at 2.12c., Philadelphia.

Sheets.—Some sales of blue annealed sheets have been made for early delivery at 2.25c., Pittsburgh, but the sales of black and galvanized sheets at the higher prices recently announced are few and far between. However, the sheet mills are operating at a fairly good rate on tonnage put on their books at the former prices, and they are hopeful of strengthening the market so that the new schedule will be accepted without question by consumers and jobbers when they purchase their third quarter requirements.

Warehouse Business.—Local jobbers have advanced prices of sheets out of stock to 4.35c. for black and to 5.20c. for galvanized, which is $4 up on black and $2 up on galvanized. No change has been made on blue annealed sheets.

Imports.—Pig iron imports again jumped up last week to a total of 2608 tons at Philadelphia. Of this, 2508 tons came from India and 100 tons from the Netherlands. Other imports were as follows: Iron one from Algeria, 6720 tons; steel ingots from Belgium, 90 tons; bars from Belgium, 104 tons; bars from Sweden, 28 tons; structural steel from Germany, 186 tons; structural steel from Belgium, 107 tons.

Old Material.—Sales of heavy melting steel totaling 65,000 tons were made to two Eastern steel companies. One company bought about 50,000 tons, and the other, 15,000 tons. Prices paid were $14.50 for delivery at Bethlehem and Steelton, Pa., and Claymont, Del., and $13.50 at Sparrows Point, Md. Distress lots of steel scrap have been offered at $14. The large purchases have not strengthened the market; they have given it a weaker tone due to the fact that, with two of the largest consumers now well satisfied for some little time and another having in stock a sufficient supply for the remainder of this quarter, prospects for further sales this month and next are too indefinite to give any firmness of tone. A further fact contributing to marked weakness in the entire list of scrap items is the continued easy supply, offerings being in excess of the demand. The market for low phosphorus grades is weak, due to a lessening of the demand from steel castings makers.

Prices per gross ton, delivered consumers' yards, Philadelphia district:

No. 1 heavy melting steel	$14.00 to $14.50
Scrap T rails	13.50 to 14.00
No. 2 heavy melting steel	12.00 to 12.00
No. 1 railroad wrought	16.50 to 17.00
Bundled sheets (for steel works)	10.50 to 11.00
Machine shop turnings (for steel works)	10.50 to 11.00
Heavy axle turnings (or equivalent)	13.00 to 13.50
Cast borings (for steel works and rolling mill)	12.00
Heavy breakable cast (for steel works)	15.50 to 16.00
Railroad grate bars	12.00
Stove plate (for steel works)	12.00
No. 1 low phos., heavy, 0.04 per cent and under	18.00 to 18.50
Couplers and knuckles	16.00 to 16.50
Rolled steel wheels	16.00 to 16.50
No. 1 blast furnace scrap	10.50 to 11.00
Machine shop turnings (for rolling mill)	11.00 to 11.50
Wrought iron and soft steel pipes and tubes (new specifications)	13.00 to 13.50
Shafting	18.00 to 19.00
Steel axles	19.00 to 20.00
No. 1 forge fire	11.00 to 12.00
Steel rails for rolling	16.50 to 17.00
Cast iron carwheels	16.00 to 16.50
No. 1 cast	17.00 to 17.50
Cast borings (for chemical plant)	15.00 to 16.00

Birmingham Steel Fabricators Busy

BIRMINGHAM, May 17.—Local fabricators of structural steel and plates are busy. The Ingalls Iron Works has an order for 2200 tons of structural steel for a warehouse and other work called for in the State's development of the port of Mobile. The Tennessee Coal, Iron & Railroad Co. will supply the sheets and bars required. All of this steel will be shipped by Federal barge line on Warrior River from the Birmingham district to Mobile. The Ingalls company will also fabricate 800 tons for the Edwin Bok carillon tower at Mountain Lake, Fla., and also 1000 tons for a new theater in Birmingham for the Famous Players-Lasky Co. The Birmingham Tank Co. has completed an order for 11 large storage tanks for Southern Cotton Seed Oil Co., Savannah, Ga.

Joseph Schonthal, president Joseph Schonthal Co., Columbus, Ohio, old material dealer, and head of the West Virginia Rail Co., Huntington, W. Va., rerolling mill, will open a summer camp for needy children and convalescent mothers at Magnetic Springs, near Columbus, on June 20.

San Francisco

Shell Oil Co. Places 3100 Tons of Plates —Cast Iron Pipe Is Active

SAN FRANCISCO, May 14 (*By Air Mail*).—With two exceptions—plates and cast iron pipe—business during the week has been confined to routine developments. Compared with the two preceding weeks, lettings in fabricated structural steel have been relatively unimportant. There has been little business recently in any department of the market to test the strength of prices, which are firm, especially on the heavier steel products, despite reports of a softening of quotations in important Eastern centers.

There has been some discussion recently in regard to a possible advance in ocean freight rates on steel shipped from Atlantic Coast ports via the Panama Canal to the Pacific Coast. So far as can be ascertained, however, none of the steamship companies is considering an imminent advance in freight rates. The present rate on structural material is 25c., base, per 100 lb. The present extra charges are as follows: On 40 to 50-ft. lengths, 10c.; on 50 to 60-ft. lengths, 15c.; on 60 to 70-ft. lengths, 20c., and on 70 to 80-ft. lengths, 25c.

Pig Iron.—Fresh inquiries are small, and little of importance has come up during the week. Quotations are unchanged.

Prices per gross ton at San Francisco:

*Utah basic	$25.00 to $26.00
*Utah foundry, sil. 2.75 to 3.25	25.00 to 26.00
**Indian foundry, sil. 2.75 to 3.25	25.00
**German foundry, sil. 2.75 to 3.25	24.25

*Delivered San Francisco.
**Duty paid, f.o.b. cars San Francisco.

Shapes.—Lettings in fabricated structural steel during the week total about 700 tons, and fresh inquiries call for 650 tons. The largest individual award, 250 tons for a high school in Oakland, Cal., was taken by the Herrick Iron Works of that city. Portland, Ore., placed 450 tons of shapes and plates for three fireboats with the Baker Construction Co. The Oregon-Washington Railroad & Navigation Co., Portland, is calling for bids on 400 tons for a girder span. Eastern mills continue to quote plain material at 2.35c., c.i.f. Coast ports.

Plates.—In Los Angeles, the Lacy Mfg. Co. has been awarded ten 80,000-bbl. tanks, calling for 3100 tons, by the Shell Oil Co. The Associated Oil Co. is expected to call for bids soon on 1550 to 3100 tons for five to ten 80,000-bbl. tanks. Sacramento, Cal., has opened bids on 608 tons for a pipe line, and the Nevada Irrigation District, Grass Valley, Cal., will take bids June 3 on 450 tons for the proposed Milton pipe line project. Eastern mills continue to quote plates at 2.30c., c.i.f. Coast ports.

Bars.—Few lettings of reinforcing steel have been made during the week. The Mercer Steel Co. took 200 tons for a garage in Portland, Ore., and in San Francisco the United States Bureau of Public Roads awarded 125 tons for five bridges for the Yosemite National Park to a local jobber. Quotations, locally, are unchanged at 2.85c., base, per lb., on lots of 200 tons, and 3.10c., base, on less-than-carload lots.

Cast Iron Pipe.—In Monrovia, Cal., a referendum will be held June 14 on a bond issue of $235,000 for the acquisition of water-bearing lands and for an extension of the present municipal water system. In Antioch, Cal., Ralph Naas, city engineer, has completed a survey and is preparing plans for a proposed new water system, the estimated cost of which is $100,000. Larger lettings of the week include the following: Long Beach, Cal., 2884 tons of 6, 8 and 12-in. Class 150 DeLavaud pipe, and 16 and 20-in. Class 100 DeLavaud pipe to the United States Cast Iron Pipe & Foundry Co. Tacoma, Wash., has placed 1101 tons of 8 to 20-in., Classes B, C and D cast iron pipe with an unnamed producer through Paine-Gallucci & Malone, general contractors, and 242 tons of 6 and 16-in., Classes B and C cast iron pipe with the United States Cast Iron Pipe & Foundry Co. Other individual lettings of less than 100-ton lots total about 200 tons. San Diego Cal., has opened bids on 400 tons of 6 and 8-in. Class B pipe for the improvement of Fairmount Avenue, and Phoenix, Ariz., has opened bids on 183 tons of 2 to 12-in. Class B pipe.

Steel Pipe.—Long Beach, Cal., has opened bids on 1515 tons of 1¼-in. to 24-in. steel gas pipe. San Bernardino, Cal., has placed about 100 tons of 6-in. lap welded pipe with the Grinnell Co. of the Pacific.

Warehouse Business.—Out-of-stock sales during the past week have been comparatively quiet. Quotations are unchanged.

Coke.—Local importers are busy disposing of shipments received one week ago. Buying is reported to be somewhat heavier. English beehive coke is quoted at $17.50 per net ton at incoming dock, and German by-product fuel is offered at $12 to $13.

Warehouse Prices, f.o.b. San Francisco

	Base per Lb.
Plates and structural shapes	3.00c.
Soft steel bars	3.00c.
Small angles, ⅞-in. and over	3.00c.
Small angles, under ⅞-in.	3.40c.
Small channels and tees, ¾-in. to 2¾-in.	3.60c.
Spring steel, ¼-in. and thicker	5.00c.
Black sheets (No. 24)	4.70c.
Blue annealed sheets (No. 10)	3.75c.
Galvanized sheets (No. 24)	5.25c.
Common wire nails, base per keg	$3.75
Cement coated nails, 100-lb. keg	3.75

St. Louis

Structural Steel Placed for Two Alton Bridges Totals 5200 Tons

ST. LOUIS, May 17.—Buying of pig iron continues light, as melters insist on maintaining minimum inventories. Scattered sales during the week amounted to less than 3000 tons, including 500 tons of basic to a melter in the district. The remainder was made up of 200 and 300-ton lots, all for delivery over the second quarter. Melters are purchasing only sufficient iron to cover orders for finished goods, despite the seemingly more serious turn of the coal strike. Prices are unchanged.

Prices per gross ton at St. Louis:

No. 2 fdy., sil. 1.75 to 2.25, f.o.b. Granite City, Ill.	$20.50 to $21.00
Northern No. 2 fdy., delivered St. Louis	22.16
Southern No. 2 fdy., delivered	22.42
Northern malleable, delivered	22.16
Northern basic, delivered	22.16

Freight rates: 81c. from Granite City to St. Louis; $2.16 from Chicago; $4.42 from Birmingham.

Coke.—The demand for coke continues light. The coal strike seems to have made no appreciable difference in the demand for coke among the industries in this district. Because of warm weather, there is almost no demand for domestic sizes.

Finished Iron and Steel.—The general contracts for the superstructures of two bridges at Alton, Ill., one across the Mississippi River, 2900 tons, and the other across the Missouri River, 2300 tons, have been let to the Wisconsin Bridge & Iron Co. and the Kansas City Bridge Co., respectively. A total of 410 tons of reinforcing bars also will be required in these two bridges.

Warehouse Prices, f.o.b. St. Louis

	Base per Lb.
Plates and structural shapes	3.25c.
Bars, soft steel or iron	3.15c.
Cold-finished rounds, shafting and screw stock	3.75c.
Black sheets (No. 24)	4.45c.
Galvanized sheets (No. 24)	5.25c.
Blue annealed sheets (No. 10)	3.60c.
Black corrugated sheets	4.65c.
Galvanized corrugated sheets	5.30c.
Structural rivets	3.60c.
Boiler rivets	3.80c.
	Per Cent Off List
Tank rivets, ⅞-in. and smaller	70
Machine bolts	60
Carriage bolts	60
Lag screws	60
Hot-pressed nuts, square, blank or tapped	60
Hot-pressed nuts, hexagons, blank or tapped	60

The orders for the material are expected to be let soon. The largest reinforcing bar order pending in some time, 1800 tons for a sedimentation basin for the St. Louis municipal waterworks plant at Hine, Mo., went to the Laclede Steel Co. The local mill reports a better business in sheets, having booked some orders from jobbers in the flooded sections who are anticipating a demand for material for reclamation work. Local jobbers also report that business is better.

Old Material.—The purchase of between 2500 and 3000 tons of melting steel by a consumer in this district is reported. The order was divided among a number of dealers, and the price paid was low. The consumer's object in buying was to lower the average cost of his raw material. Other consumers are disposed to buy for the same purpose if sufficiently low prices are offered. Otherwise the market is dead. Melting steel is down 25c. a ton. Dealers are buying only to cover contracts. Railroad lists include: Chesapeake & Ohio, 12,600 tons; Rock Island, 9245 tons; Chicago, Milwaukee & St. Paul, 2315 tons; Chicago & Alton, 1545 tons; Texas & Pacific, 1000 tons; Nickle Plate, 1500 tons; Pullman Co., St. Louis, 200 tons; and St. Louis-San Francisco, 300 tons.

Prices per gross ton f.o.b. dealers' yards and delivered St. Louis district consumers' works:

Heavy melting steel	$11.50 to $12.00
No. 1 locomotive tires	15.00 to 15.50
Heavy shoveling steel	11.50 to 12.00
Miscellaneous standard-section rails, including frogs, switches and guards, cut apart	12.75 to 13.25
Railroad springs	13.50 to 14.00
Bundled sheets	8.50 to 9.00
No. 2 railroad wrought	11.75 to 12.25
No. 1 busheling	10.00 to 10.50
Cast iron borings	9.00 to 9.50
Iron rails	14.00 to 14.50
Rails for rolling	14.00 to 14.50
Machine shop turnings	6.75 to 7.25
Steel car axles	19.00 to 19.50
Iron car axles	23.00 to 23.50
Wrought iron bars and transoms	19.50 to 20.00
No. 1 railroad wrought	12.00 to 12.50
Steel rails, less than 3 ft.	15.50 to 16.00
Steel angle bars	12.00 to 12.50
Cast iron carwheels	14.00 to 14.50
No. 1 machinery cast	17.50 to 18.00
Railroad malleable	12.50 to 13.00
No. 1 railroad cast	15.00 to 15.50
Agricultural malleable	13.00 to 13.50
Relaying rails, 60 lb. and under	20.50 to 23.50
Relaying rails, 70 lb. and over	26.50 to 29.00

Birmingham

Steel Output Curtailed But Keeping Pace with Last Year

BIRMINGHAM, May 17.—Both consumers and producers of pig iron have become accustomed to the small-lot method of buying, and, as a rule, the former merely make inquiry as to whether they can get the grade wanted before placing the order. Furnace interests are encouraged by the fact that melters are taking their iron steadily, and some report that shipments, though in small lots, are aggregating more than the make. The Sloss-Sheffield Steel & Iron Co. reports that its shipments in the first four months of the year exceeded production and that surplus iron on its yards has been worked down. No business has been placed as yet for third quarter delivery, though cast iron pressure pipe makers have either closed or are figuring on pipe business for delivery during that period. Several of the larger jobbing foundries in this district are busily engaged, handling a wide range of work. The Birmingham Machine & Foundry Co. in the past week shipped an entire carload of filling station gasoline pumps to Richmond, Va., and a carload of autolifts, a patented product, to New York. The Hardie-Tynes Mfg. Co. plant is preparing to manufacture crushed coal-burning devices. One of the larger local foundries has taken a large order for culvert pipe for delivery in Cuba.

Prices per gross ton, f.o.b. Birmingham district furnaces:

No. 2 foundry, 1.75 to 2.25 sil.	$18.00
No. 1 foundry, 2.25 to 2.75 sil.	18.50
Basic	18.00
Charcoal warm blast	29.00

Rolled Steel.—Though several open-hearth furnaces are still idle, estimates are that steel production in Alabama is holding its own as compared with 1926. Fabricating shops report considerable activity, but with prices low and competition keen. Foreign competition in steel is reported to have reached the shores of Alabama, within 500 miles of the great industrial district of the South. Plate shops in this district are again becoming active as the result of a spurt in orders. The Birmingham district during the four and a half months of this year has taken up the manufacture of more different products than in any similar period, many of them products which never had been regarded as suitable for profitable manufacture in this section. Finished steel prices are unchanged.

Cast Iron Pipe.—Shops are producing almost to capacity, and recent lettings covered sand cast, as well as centrifugal, pressure pipe. Specifications are in sight for additional tonnage which will warrant steady operation of shops well into the third quarter. The greater portion of the accumulated stock of cast iron pressure pipe on yards has been moved off, and there will continue to be liberal shipments for some time to come. Production estimates for the year all show increases as compared with the previous year. Quotations range from $36 to $37, Birmingham, on 6-in. and larger diameters, with reports of concessions current.

Coke.—No accumulation of stocks is reported for independent coke producers, those interests having been limiting output to conform to demand. Foundry coke prices are still at $5.50 per net ton, Birmingham, and the little beehive coke that is being manufactured is held at $6. Greater demand for coke is looked for.

Old Material—Though dealers are in a position to get all the scrap they are likely to need, it is to be observed that no effort is being made to stir up business. The usual calls are being made on consumers, but no concessions or other inducements are offered to obtain tonnage contracts.

Prices per gross ton, delivered Birmingham district consumers' yards:

Heavy melting steel	$12.00 to $12.25
Scrap steel rails	12.50 to 13.00
Short shoveling turnings	8.00 to 8.50
Cast iron borings	8.00 to 8.50
Stove plate	13.00 to 14.00
Steel axles	16.00 to 17.00
Iron axles	16.00 to 17.00
No. 1 railroad wrought	11.00 to 12.00
Rails for rolling	15.00 to 16.00
No. 1 cast	15.00 to 16.00
Tramcar wheels	15.00 to 16.00
Cast iron carwheels	14.00 to 15.00
Cast iron borings, chemical	13.00 to 14.00

Toronto

Scrap Sales Bulk Large—Heavier Pig Iron Specifications

TORONTO, ONT., May 17.—With the exception of a rather strong demand for pig iron in small-tonnage lots for spot delivery, the market has few features. Some booking for third quarter has been done, but so far there has been no rush on the part of melters to cover past the end of June and producers are inclined to put off long-term contracts as far into the future as possible. Orders against contract are materially swelling the movement of foundry and malleable iron between producer and consumer, and as a consequence the production of these grades is being maintained at a high level. Six blast furnaces with a capacity of 47 per cent of the total possible output of the Dominion are producing pig iron at the present time. Imports of pig iron into Canada from the United States average about 2500 tons per month, and these have recently been augmented by about 600 tons during the past month from Great Britain and some smaller tonnages from other European countries.

Prices per gross ton:

Delivered Toronto	
No. 1 foundry, sil. 2.25 to 2.75	$24.10
No. 2 foundry, sil. 1.75 to 2.25	24.10
Malleable	24.10
Delivered Montreal	
No. 1 foundry, sil. 2.25 to 2.75	26.50
No. 2 foundry, sil. 1.75 to 2.25	26.50
Malleable	26.50
Basic	25.50
Imported Iron at Montreal Warehouse	
Summerlee	36.00
Carron	36.00

Old Material.—Sales have shown some improvement over those of the previous week, and the tonnage handled by dealers compares favorably with the totals for some of the best weeks this year. The current demand for scrap is still confined to immediate requirements, but melters are coming into the market more freely and in many cases tonnages called for in individual orders are larger. From the Hamilton district dealers report a steady demand for heavy melting steel, turnings, and various other grades, while foundries throughout Ontario and Quebec have been buying machinery cast and malleable scrap in larger quantities. Montreal dealers report some improvement in export business, but so far the volume has been below earlier predictions, averaging around 6000 tons per month, practically all of which is for shipment to the United States.

Dealers' buying prices:

	Toronto	Montreal
Per Gross Ton		
Heavy melting steel	$10.50	$9.00
Rails	11.00	10.00
No. 1 wrought	11.00	14.00
Machine shop turnings	8.00	7.50
Boiler plate	8.00	8.00
Heavy axle turnings	8.50	8.50
Cast borings	8.50	7.50
Steel turnings	8.00	8.00
Wrought pipe	6.00	6.00
Steel axles	15.00	17.00
Axles, wrought iron	17.00	19.00
Per Net Ton		
No. 1 machinery cast	16.00	18.00
Stove plate	10.00	13.00
Standard carwheels	14.00	16.00
Malleable scrap	14.00	14.00

Boston

Foreign Offerings of Warehouse Steel —Keen Competition in Pig Iron

BOSTON, May 17.—Pig iron sales in this territory have been limited, and current business has been booked largely by two furnaces east of Buffalo, which are pressing for orders, naming prices lower than other furnaces are willing to meet. Consequently most producers are securing only mixture tonnages. A sale of 150 tons of No. 2X iron has been made at a delivered price equivalent to $17.50 a ton, Buffalo furnace, or $17, base. An order has been taken by another producer for No. 2X iron at $19.50 a ton, furnace, or $21.50, delivered, which figures back to $16.59 a ton, Buffalo furnace, or $16.09, base, if silicon differentials are considered. The same maker, where the freight has been more than $2 a ton, has sold No. 2X iron at $19, furnace. One of the two furnaces now most active in the market is reported to have sold approximately 56,000 tons of iron since Jan. 1, a major portion of it for third quarter delivery. Indian iron appears to have faded out of the picture as quickly as it appeared. Recent sales of that iron were at a premium over prices on domestic iron. An eastern Massachusetts melter is asking for quotations on 200 tons of No. 2X and 100 tons of No. 1X for delivery during the current quarter, and on 400 tons of No. 2X and 200 tons of No. 1X for third quarter. There are no other open inquiries of importance.

Warehouse Prices, f.o.b. Boston

	Base per Lb.
Plates	3.365c.
Structural shapes—	
Angles and beams	3.365c.
Tees	3.365c.
Zees	3.465c.
Soft steel bars and small shapes	3.265c.
Flats, hot-rolled	4.15c.
Reinforcing bars	3.265c. to 3.54c.
Iron bars—	
Refined	3.265c.
Best refined	4.60c.
Norway, rounds	6.60c.
Norway, squares and flats	7.10c.
Spring steel—	
Open-hearth	5.00c. to 10.00c.
Crucible	12.00c.
Tire steel	4.50c. to 4.75c.
Bands	4.015c. to 5.00c.
Hoop steel	5.50c. to 6.00c.
Cold rolled steel—	
Rounds and hexagons	4.05c.
Squares and flats	4.55c.
Toe calk steel	6.00c.

Prices of foundry iron per gross ton, delivered to most New England points:

Buffalo, sil. 1.75 to 2.25	$22.41 to $22.91
Buffalo, sil. 2.25 to 2.75	22.91 to 23.41
East. Penn., sil. 1.75 to 2.25	24.15 to 24.65
East. Penn., sil. 2.25 to 2.75	24.65 to 25.15
Virginia, sil. 1.75 to 2.25	27.42
Virginia, sil. 2.25 to 2.75	27.92
Alabama, sil. 1.75 to 2.25	24.91 to 26.77
Alabama, sil. 2.25 to 2.75	25.41 to 27.27

Freight rates: $4.91 from Buffalo, $3.65 from eastern Pennsylvania, $5.92 from Virginia, $6.91 to $8.77 from Alabama.

Shapes and Plates.—Standard shapes at 1.75c. per lb., base Pittsburgh, are a thing of the past apparently. Such material is generally held at 1.80c. today. The market for plates is much firmer than that for shapes, with 1.85c., base Pittsburgh, the average asking price. Large fabricating jobs are scarce, but there is a large aggregate in small tonnages, and most fabricators have much larger backlogs than they had a month ago.

Warehouse Business.—Some falling off is noted in the movement of material out of warehouses. Current buying is in small lots, and competition is exceptionally keen. It is estimated that not more than 10 per cent of current bookings are at published list prices. Offerings of imported material at low prices by a Concord Junction, Mass., firm has unsettled the market for domestic steel. Imported angles are offered at 2.10c. to 2.30c., and bands at 2.75c. per lb., net. If Boston delivery is required, 12½c. per 100 lb. is charged.

Old Material.—Prices on old material that is moving, in most instances, are weak. Yard steel is an exception and is still selling at $7 to $7.60 a ton, on cars shipping point, mostly for shipment to two Pennsylvania consuming points. Quotations on inactive materials are largely nominal. Recent transactions include sales of machine shop turnings at $5.50 to $5.75, on cars, a decline of 50c. from a week ago. One sale is reported at $10.50 delivered, or $5.35, on cars, with the broker's profit 35c. a ton. Mixed borings and turnings, which range from $5.50 to $6, on cars, are down 25c. to 50c. a ton. A car of bushings and turnings was sold at $4.30 a ton; several cars of heavy annealing pots, at $5.30 a ton; a car of selected 4½ in. shafting, at $14.50 a ton, with other lots bringing 50c. a ton less, and scattered cars of chemical borings brought around $10.60, on cars. Brokers report that there is no demand for forged scrap, long bundled skeleton or forged flashings, and there is almost no call for specification pipé. The General Electric Co., West Lynn, Mass., closes bids this week on an average offering of miscellaneous material.

Buying prices per gross ton, f.o.b. Boston rate shipping points:

No. 1 heavy melting steel	$9.50 to $10.00
Scrap rails	9.50 to 10.00
No. 1 railroad wrought	11.50 to 12.00
No. 1 yard wrought	10.00 to 10.25
Machine shop turnings	5.50 to 5.75
Cast iron borings (steel works and rolling mill)	6.50 to 7.00
Bundled skeleton, long	6.20 to 7.00
Forged flashings	6.20 to 7.00
Blast furnace borings and turnings	5.50 to 6.00
Forged scrap	6.20 to 7.00
Shafting	14.00 to 14.50
Street car axles	15.00 to 15.50
Wrought pipe (1 in. in diameter, over 2 ft. long)	8.00 to 8.50
Rails for rerolling	11.00 to 11.50
Cast iron borings, chemical	10.50 to 11.00
Prices per gross ton, delivered consumers' yards:	
Textile cast	$14.50 to $15.00
No. 1 machinery cast	14.50 to 15.00
No. 2 machinery cast	12.50 to 13.00
Stove plate	8.75 to 9.25
Railroad malleable	15.00 to 15.50

Cast Iron Pipe.—The outstanding feature of the pipe market is the large amount of private buying. Providence, R. I., has awarded 400 tons of 4-in. pipe to R. D. Wood & Co., Portland, Me., closed bids May 16 on 300 tons of 16 and 20-in. pipe, and Fall River, Mass., took figures May 17 on 200 tons of 6 and 8-in. pipe. Concessions are still obtainable on large pipe, but the market for small sizes is holding firm. Prices quoted on domestic pipe are: 4-in., $58.10 a ton, delivered common Boston freight rate points; 6 to 12-in., $53.10

to $54.10; larger pipe, $52.10 to $53.10. A $5 differential is asked on Class A and gas pipe.

Coke.—The movement of by-product foundry coke from New England ovens is less active, if anything. Foundries either have sufficient surplus stocks, bought in anticipation of higher prices as a result of the coal strike, or their margin of profit is so small, because of the keen competition for casting orders, that fuel is ordered in only as urgent needs require. The New England Coal & Coke Co. and the Providence Gas Co. are billing foundry coke at $12 a ton, delivered within a $3.10 freight rate zone, contrasted with $12.50 a month ago. Although no official statement has been made, it is said that these companies will open their books for last half contracts late this month or early in June. In that event bookings will be made at about the same time as last year.

Cincinnati

Lake Furnaces Press for Pig Iron Business—Heavy Melting Lower

CINCINNATI, May 17.—Lake furnaces again are dominating the pig iron market in the southern Ohio district. On an inquiry from the Hamilton Foundry & Machine Co., Hamilton, Ohio, for 4500 tons of foundry iron for delivery over the remainder of the year a northern Ohio producer is reported to have been the successful bidder, the selling price having been $18, base furnace, with silicon differentials waived. This would figure back to less than $17.25 on the base grade at the furnace. Two inquiries now before the trade, one of 1000 tons for the Globe Stove & Range Co., Kokomo, Ind., and the other of 2200 tons for the Marmon Motor Car Co., Indianapolis, probably will be closed, with Lake furnaces getting the business. There has been no change in southern Ohio foundry iron, which is quoted at $19.50 to $20, base Ironton. Sales have been confined to small lots for early delivery. A local dealer has sold 500 tons of Tennessee iron to a Cleveland company. Both Tennessee and Alabama iron are firm at $18, base Birmingham. Melters are taking second quarter requirements only at a fair rate. The Norton furnace at Ashland, Ky., was blown in May 15 and will supply basic iron to the open-hearth furnaces at the Ashland works of the American Rolling Mill Co.

Prices per gross ton, delivered Cincinnati:

So. Ohio fdy., sil. 1.75 to 2.25	$21.39 to $21.89
So. Ohio malleable	20.64 to 21.89
Alabama fdy., sil. 1.75 to 2.25	21.69
Alabama fdy., sil. 2.25 to 2.75	22.19
Tennessee fdy., sil. 1.75 to 2.25	21.69
Southern Ohio silvery, 8 per cent	30.39

Freight rates: 1.89 from Ironton and Jackson, Ohio; $3.69 from Birmingham.

Finished Material.—Demand for finished steel has lessened, both orders and specifications being affected by decreased buying on the part of consumers. Almost all bookings consist of small tonnages for immediate delivery, and with general industrial conditions in this territory only fair at best, buyers are not likely to add appreciably to present stocks. The flood in the lower Mississippi Valley is having a decidedly unsettling effect upon business in the South, this unfavorable condition being reflected in the curtailment of purchases by agricultural implement manufacturers, stove makers and the railroads serving the affected district. Jobbers are taking more material than a few weeks ago. Prices in general have remained firm and unchanged. The recent advance announced by sheet manufacturers is being strictly adhered to, and a fair amount of material is moving at the new schedule. Black and galvanized sheets are quoted at 3c. and 3.85c., base Pittsburgh, respectively, with blue annealed selling at 2.25c. Automobile manufacturers are calling for fairly liberal tonnages of sheets, while electrical sheets are moderately active. In bars and structural steel the market is sagging slightly, but 1.90c., base Pittsburgh, still is the prevailing price. Considerable work has come out in the past two weeks, so that indications are that fabricators will be well engaged during the next few months. Jobs are being taken, however, at concessions. There has been no change in wire goods, common wire nails being quoted at $2.72 per keg, delivered Cincinnati, when shipment is made by water.

Warehouse Prices, f.o.b. Cincinnati

	Base per Lb.
Plates and structural shapes	3.40c.
Bars, soft steel or iron	3.30c.
Reinforcing bars	3.30c.
Hoops	4.00c. to 4.25c.
Bands	3.95c.
Cold-finished rounds and hexagons	3.85c.
Squares	4.35c.
Open-hearth spring steel	4.75c. to 5.00c.
Black sheets (No. 24)	4.05c.
Galvanized sheets (No. 24)	4.90c.
Blue annealed sheets (No. 10)	3.60c.
Structural rivets	3.85c.
Small rivets	65 per cent off list
No. 9 annealed wire, per 100 lb	$3.00
Common wire nails, base per keg	2.95
Cement coated nails, base per 100 lb. keg	2.95
Chain, per 100 lb	7.55
	Net per 100 Ft.
Lap welded steel boiler tubes, 2-in	$18.00
4-in.	38.00
Seamless steel boiler tubes, 2-in	19.00
4-in.	39.00

Reinforcing Bars.—The Pollak Steel Co. will supply about 200 tons of bars for the new shops of the Cincinnati Car Co., Cincinnati, while Hugh J. Baker & Co. is reported to have taken 400 tons for the Masonic Temple in Indianapolis. Although the market is quiet at the moment, a number of attractive jobs are expected to open up in the near future. New billet bars are quoted at 1.80c. to 1.90c., base Pittsburgh, and rail steel bars at 1.75c. to 1.80c., base mill.

Warehouse Business.—Sales in the first half of May showed an increase over those in the corresponding period during April. The betterment is accounted for by the larger movement of bars, tank plates and structural steel. Prices are firm and there is no sign of any changes in the immediate future.

Coke.—Dullness pervades the coke market. Increased specifications from several foundries supplying castings to the automobile industry have not been sufficient to offset the decreased demand from consumers in this district. There has been slight improvement in sales of by-product domestic grades, but bookings are still light. Prices are unchanged.

Foundry coke prices per net ton, delivered Cincinnati: By-product coke, $9.52 to $9.64; Wise County coke, $7.59 to $8.09; New River coke, $10.09 to $10.59. Freight rates: $2.14 from Ashland, Ky.; $2.59 from Wise County and New River ovens.

Old Material.—Heavy melting steel has declined another 25c. a ton, and many other items are considerably weaker. Steel plants are taking moderate shipments on contract, but are not making new purchases even at low prices. Aside from orders for small lots for immediate delivery, activity in foundry grades is practically at a standstill.

Dealers' buying prices per gross ton, f.o.b. cars, Cincinnati:

Heavy melting steel	$12.00 to $12.50
Scrap rails for melting	12.75 to 13.25
Loose sheet clippings	8.50 to 9.00
Champion bundled sheets	9.50 to 10.00
Cast iron borings	8.75 to 9.25
Machine shop turnings	8.00 to 8.50
No. 1 busheling	9.50 to 10.00
No. 2 busheling	7.00 to 7.50
Rails for rolling	14.00 to 14.50
No. 1 locomotive tires	16.50 to 17.00
No. 1 railroad wrought	12.00 to 12.50
Short rails	17.50 to 18.00
Cast iron carwheels	13.00 to 13.50
No. 1 machinery cast	17.50 to 18.50
No. 1 railroad cast	14.50 to 15.00
Burnt cast	8.50 to 9.00
Stove plate	10.00 to 10.50
Brake shoes	10.25 to 11.00
Railroad malleable	13.50 to 14.00
Agricultural malleable	13.00 to 13.50

Plans for building a $12,000,000 dock terminal and warehouse at the foot of East Fifty-fifth Street, Cleveland, have been announced by the Cleveland Railway & Harbor Terminal Co., which has been organized for this purpose. While this will be an independent company, its warehouse will be a link in a chain of warehouses and other terminal facilities for coordinating the rail and water transportation systems of the Great Lakes. F. E. Blumenthal, head of the Detroit Railway & Harbor Terminal Co., is the executive head of the Cleveland Railway & Harbor Terminal Co.

Buffalo

Heavier Buying of Scrap—Prices on Structural Shapes Easier

BUFFALO, May 17.—Bookings of pig iron by local producers for the week totaled about 5000 tons. Inquiry has dwindled, and a 200 or 300-ton lot now looms large. Furnace men are encouraged by the steadiness of prices. No large inquiry has tested the market in weeks, but the small-lot buyer apparently cannot do better than $18, base furnace, for foundry grade. Makers state they are obtaining the silicon differentials on No. 2X and No. 1X. The Lackawanna plant of the Bethlehem Steel Co. is operating six of its stacks, an increase of one furnace not heretofore reported. The outlook for further increases in furnace operations is not bright.

Prices per gross ton, f.o.b. Buffalo furnace:

No. 2 plain fdy., sil. 1.75 to 2.25	$17.50 to $18.00
No. 2X foundry, sil. 2.25 to 2.75	18.00 to 18.50
No. 1X foundry, sil. 2.75 to 3.25	19.00 to 19.50
Malleable, sil. up to 2.25	17.50 to 18.00
Basic	17.50 to 17.75
Lake Superior charcoal	27.28

Old Material.—Steel mill operations are improving, and there has been increased buying of scrap. This purchasing has been continuous on the part of three consumers over the entire week, though no large tonnages have been placed. One mill is buying at $15, and another is paying $15.50 for heavy melting steel, while in a few instances this grade has brought as high as $15.75. Some buying of low phosphorus grades by steel castings plants has taken place, and there has been a slight demand for cast iron borings. Sales of stove plate at $14.75 to two cousumers are recorded. Little out-of-the-district business is going through, because the prices being paid outside will not permit dealers to ship at a profit. Scrap yards are not stocking with materials as they have in the past. No yard is operating at over 25 per cent.

Prices per gross ton, f.o.b. Buffalo consumers' plants:

Basic Open-Hearth Grades	
No. 1 heavy melting steel	$15.50 to $16.00
No. 2 heavy melting steel	14.50 to 15.00
Scrap rails	16.00 to 16.50
Hydraulic compressed sheets	14.50 to 15.00
Hand-bundled sheets	11.00 to 11.50
Drop forge flashings	13.00 to 13.50
No. 1 busheling	14.50 to 15.00
Heavy steel axle turnings	14.00 to 14.50
Machine shop turnings	9.00 to 9.50
Acid Open-Hearth Grades	
Railroad knuckles and couplers	17.50 to 18.00
Railroad coil and leaf springs	17.50 to 18.00
Rolled steel wheels	17.50 to 18.00
Low phosphorus billet and bloom ends	17.50 to 18.00
Electric Furnace Grades	
Heavy steel axle turnings	14.00 to 14.50
Short shoveling steel turnings	11.50 to 12.00
Blast Furnace Grades	
Short shoveling steel turnings	11.50 to 12.00
Short mixed borings and turnings	10.00 to 10.50
Cast iron borings	11.00 to 11.50
No. 2 busheling	13.50 to 14.00
Rolling Mill Grades	
Steel car axles	17.00 to 17.50
No. 1 railroad wrought	13.00 to 13.50
Cupola Grades	
No. 1 machinery cast	16.50 to 17.00
Stove plate	14.00 to 14.50
Locomotive grate bars	13.00 to 13.50
Steel rails, 3 ft. and under	18.00 to 18.50
Cast iron carwheels	15.00 to 16.00
Malleable Grades	
Railroad	16.50 to 17.00
Agricultural	16.50 to 17.00
Industrial	16.50 to 17.00

Finished Iron and Steel.—The going price on carbon steel bars is still 2.165c., Buffalo, though on very desirable tonnage it is possible that 2.115c. might be done. Shapes are not so firm as recently, and can be bought at 2.065c. to 2.115c., Buffalo. Plates are steady at 2.115c., Buffalo. Sheets are being held at 3c., base Pittsburgh, for No. 28 gage black and at 4.25c. for automobile body. The volume of business at these prices is fair. Reinforcing bars are in fair demand. For a school in Rochester, N. Y., 100 tons has been awarded to a Buffalo maker, and a 100-ton school job in Buffalo is out for bids. There will be another letting of roads involving a round tonnage of welded fabric mesh on May 20.

Warehouse Prices, f.o.b. Buffalo

	Base per Lb.
Plates and structural shapes	3.40c.
Soft steel bars	3.30c.
Reinforcing bars	2.75c.
Cold-finished flats, squares and hexagons	4.45c.
Rounds	3.95c.
Cold rolled strip steel	5.85c.
Black sheets (No. 24)	4.30c.
Galvanized sheets (No. 24)	5.15c.
Blue annealed sheets (No. 10)	3.80c.
Common wire nails, base per keg	$3.90
Black wire, base per 100 lb	3.90

RATE ADVANCES DISALLOWED

Ohio Commission Takes Exception to Proposed Changes in Pig Iron Rates

CLEVELAND, May 17.—A proposed advance in pig iron freight rates in Ohio has been disallowed in a decision handed down by the Ohio Public Utilities Commission, May 11. An advance is not justified, the commission ruled. This ruling follows closely a decision of the Interstate Commerce Commission involving interstate rates in the Central States, including Ohio, in which readjustments that included many advances in pig iron rates in the Central Freight Association territory were upheld with three exceptions. The Ohio rates and the interstate rates were considered together, as the same issues were involved.

The Ohio commission took exception, so far as Ohio was concerned, to the opinion of the Interstate Commerce Commission that the proposed adjustments were generally satisfactory to producers and consumers. The refusal of the Ohio commission to allow railroads to raise rates in Ohio, while it benefits the consumers, leaves the pig iron freight rate situation in this State in an unsatisfactory condition. The Ohio rates admittedly have long been in a badly tangled state. They were unbalanced, and the Ohio roads in revising rates both upward and downward evidently attempted to make a fairly equitable relation between the producing districts. However, because of the refusal of the Ohio commission to allow advances the competitive relationship of the Ohio producers is not improved.

The proposed advances in Ohio freight rates were contained in schedules brought out by the carriers last year that were to become effective Nov. 1. These provided for a general revision in rates. However, the readjustments were mostly upward. Following protests of producers and consumers the Ohio commission allowed the reductions to go into effect but suspended the advances until May 31. The proposed tariffs included advances from all the Ohio producing centers, all of which the commission has disallowed.

A considerable part of the Ohio commission's decision related to the rate to Canton, which has been a matter of contention at various times. This started with a reduction by the Pennsylvania Railroad of the rate from Leetonia to Canton from $1.76 to $1.26 per gross ton. Later Youngstown, the Corrigan, McKinney Steel Co., Cleveland, and Warren, Ohio, demanded a similar reduction and got it. The carriers proposed to advance the Canton rate to $1.65, but the commission in canceling the advance declared that the present rate is not too low and that the proposed rate was unreasonably high. The commission listed present pig iron rates between a number of other points to show that they are as low or lower for about the same distance.

In a related case the Ohio commission held that the rates of $1.57 from Canton and of $1.65 from Massillon to Newcomerstown are unreasonable and discriminating to the extent that they exceed $1.26 and ordered that the rates from the two points to Newcomerstown be reduced to $1.26 on or before June 15. It pointed out that the distances from the two points to Newcomerstown, 44 and 42 miles, compare with a range of 38 to 60 miles to Canton from Cleveland, Youngstown and other producing points having a rate of $1.26.

It is expected that the Ohio carriers will continue their fight for higher pig iron rates.

A tri-state engineering meeting, to be attended by engineering societies of Erie and Pittsburgh, Cleveland and Buffalo, will be held at Erie, Pa., June 3 and 4, under the auspices of the Erie section of the American Society of Mechanical Engineers and the power division of the A. S. M. E.

FABRICATED STRUCTURAL STEEL

Large Number of Projects Make Total of 29,000 Tons in Week's Awards

Structural steel business in the past week was characterized by the fairly large number of small projects, the total being about 24,000 tons, the largest being 3100 tons for oil tanks for a California oil company. Pending projects total about 27,500 tons. Awards follow:

CAMBRIDGE, MASS., 150 tons, garage, National Biscuit Co., to A. L. Smith Iron Works.

WELLESLEY, MASS., 100 tons, printing plant, to Boston Bridge Works, Inc.

LAWRENCE, MASS., 105 tons, Emerson Mfg. Co. plant, to New England Structural Co.

FALL RIVER, MASS., 400 tons, power house for Stone & Webster, to American Bridge Co.

PROVIDENCE, 125 tons, school addition, to James H. Tower Iron Works.

PROVIDENCE, R. I., 450 tons, State office building, to James H. Tower Iron Works.

MIDDLETOWN, CONN., 150 tons, laboratory, to an unnamed fabricator.

MERIDEN, CONN., 125 tons, Masonic Temple, to American Bridge Co.

NEW YORK, 125 tons, repair work on elevated railroad stations, to Buckingham Steel Co.

NEW YORK, 2750 tons in the following awards as reported to the Structural Steel Board of Trade: 14-story apartment building, Eighty-sixth Street and Central Park West, to Hay Foundry & Iron Works, and 17-story office building, Broadway and Sixty-first Street, to Taylor-Fichter Steel Construction Co.

BROOKLYN, tonnage unstated, Norwegian Home for Aged, 1242 Sixty-second Street, to Longacre Iron Works.

HACKENSACK, N. J., 200 tons, distributing building for R. H. Macy & Co., New York, to J. G. Smith Iron Works.

CONOWINGO, MD., 175 tons, highway bridge, to American Bridge Co.

MOUNTAIN LAKES, FLA., 800 tons, Edwin Bok carillon tower, to Ingalls Iron Works.

BIRMINGHAM, 1000 tons, theater for Famous Players-Lasky Co., to Ingalls Iron Works.

MOBILE, ALA., 2200 tons, warehouse and other work for port development, to Ingalls Iron Works.

OSWEGO, N. Y., 1000 tons, paper mill, to Williams Bridge Co.

ALEXANDRIA BAY, N. Y., 100 tons, grade and high school, to Jones & Laughlin Steel Corporation.

PITTSBURGH, 800 tons, five barges for J. K. Davison & Brother, to American Bridge Co.

PITTSBURGH, 500 tons, Pennsylvania Railroad bridge, to American Bridge Co.

CLEVELAND, 250 tons, Hamilton-East Fifty-third Street warehouse, to Republic Structural Iron Works Co.

DETROIT, 1760 tons, factory for Peninsula Stove Co., to Whitehead & Kales Co.

DETROIT, 500 tons, factory building for Briggs Mfg. Co., to Whitehead & Kales Co.

CINCINNATI, 600 tons, car barns for Cincinnati Street Railway Co., to American Bridge Co.

CHICAGO, 400 tons, Three Links Building, to Vanderkloot Steel Works, local.

SHAKOPEE, MINN., 540 tons, highway bridge, to Minnesota Steel & Machinery Co.

RACINE, WIS., 730 tons, addition for Ajax Rubber Co., to Milwaukee Bridge Co.

MILWAUKEE, 100 tons, steel for Lansing Shoal light station, Lake Michigan, to Milwaukee Structural Steel Co.

ST. LOUIS, 250 tons, St. Louis College of Pharmacy, to St. Louis Structural Steel Co.

TEXAS & PACIFIC RAILROAD, 500 tons, bridges, to Virginia Bridge & Iron Co.

SACRAMENTO, CAL., 140 tons, sand filters for the city, to Western Pipe & Steel Co.

OAKLAND, CAL., 580 tons, two 55,000-bbl. and one 37,500-bbl. tanks for California Petroleum Corporation, to Western Pipe & Steel Co.

OAKLAND, 250 tons, high school, Park Boulevard and Hopkins Street, to Herrick Iron Works, local.

SAN FRANCISCO, 120 tons, apartment building on Larkin Street, to Herrick Iron Works.

SAN FRANCISCO, 200 tons, apartment building, Green and Webster Streets, to Golden Gate Iron Works.

LOS ANGELES, 3100 tons, 10 80,000-bbl. tanks for the Shell Oil Co., to Lacy Mfg. Co., local.

LOS ANGELES, 120 tons, tank work for unnamed interests, to Western Pipe & Steel Co.

PORTLAND, ORE., 450 tons, three fireboats, 150 tons each, for the city of Portland, to Baker Construction Co., local.

PORTLAND, 1100 tons, Publix Theater, to Poole & McGonigle, local.

ATLANTIC CITY, N. J., 300 tons, Professional Arts Building, to American Bridge Co.

PENNSYLVANIA RAILROAD, 180 tons, two bridges, one each to American Bridge Co. and Bethlehem Steel Co.

DULUTH, MINN., 675 tons, six barges, to Marion Iron & Shipbuilding Works, Duluth.

ALTON, ILL., 5300 tons, two bridges; across Mississippi River, 2900 tons, across Missouri River, 2300 tons; general contracts for superstructure to Wisconsin Bridge & Iron Co. and Kansas City Bridge Co., respectively.

Structural Projects Pending

Inquiries for fabricated steel work include the following:

EAST BOSTON, 100 tons, theater and stores.

BOSTON, 150 tons, home for Italian children, Jamaica Plain.

SANDISFIELD, MASS., 175 tons, bridge and approaches.

WORCESTER, MASS., 225 tons, car barn, Worcester Consolidated Street Railway.

WORCESTER, 160 tons, building for buses, Worcester Consolidated Street Railway.

STATE OF NEW HAMPSHIRE, 150 tons, highway bridges.

NEW HAVEN, CONN., 250 tons, grandstand for Yale University.

NEW YORK, 2000 tons, De Pinna store on Fifth Avenue.

NEW YORK, 1500 tons, furniture warehouse on Second Avenue for C. L. Pierson Co.

BROOKLYN, 625 tons, parochial school.

SYRACUSE, N. Y., 400 tons, printing plant for Syracuse *Herald*.

NEW YORK STATE, 420 tons, highway bridges.

NEW YORK CENTRAL, 1250 tons, 500 tons for a power house at Buffalo, and 750 tons for bridges.

PHILADELPHIA, 500 tons, Jewish Synagogue.

DARBY, PA., 425 tons, theater.

MEMPHIS, 1330 tons, 12 barges for Mississippi River Commission; American Bridge Co. low bidder.

SAGINAW, MICH., 2000 tons, tanks for Standard Oil Co. of Indiana.

CHICAGO, 2000 tons, Roosevelt Road bridge.

CHICAGO, 115 tons, approaches to Thirty-first Street viaduct; Kelly-Atkinson Construction Co., general contractors.

SPRINGFIELD, ILL., 200 tons, Catholic cathedral.

PORT WASHINGTON, WIS., 165 tons, new Mequon stationary span; bids on complete work close May 20.

PUEBLO, COLO., 700 tons, crane runway for Colorado Fuel & Iron Co.

ANACONDA, MONT., 500 tons, building for Anaconda Copper Co.

PORTLAND, ORE., 400 tons, girder span for Oregon-Washington Railroad & Navigation Co.

BERKELEY, CAL., 250 tons, church, Dana Street, between Bancroft Way and Durant Avenue.

GRASS VALLEY, CAL., 450 tons, pipe line for Nevada Irrigation District; bids June 3.

SACRAMENTO, CAL., 608 tons, pipe line for the city; bids in.

LOS ANGELES, 1550 to 3100 tons, 5 to 10 80,000-bbl. tanks for Associated Oil Co.; bids soon.

HAZELCREST, ILL., 275 tons, bridge work for Illinois Central Railroad.

LANCASTER, PA., 100 tons, bridge over Chickies Creek.

PHILADELPHIA, 280 tons, Northeast sewage disposal plant for city.

ROCHESTER, N. Y., 1000 tons, Keith-Albee Theater.

ROCHESTER, 650 tons, Harper Sibley Building.

ROCHESTER, 300 tons, chemistry building for University of Rochester.

Hardware Makers Organize Kindred Producing Groups

Organization of the membership of the American Hardware Manufacturers' Association into kindred producing groups in an effort to obtain maximum benefit to the individual manufacturer was announced at the convention of that association and the Southern Hardware Jobbers Association held at Memphis, Tenn., during the week of May 10. At the January meeting of the executive committee of the manufacturers' association a committee had been appointed to investigate such a plan, and the formation of the following seven groups was authorized: Mechanics tools, including tools for workers in both wood and metal; agricultural implements; builders' hardware; household supplies and cutlery; sporting goods, including guns and gun goods; automobile accessories, and heavy hardware.

The group plan will go into effect with separate meetings of the individual groups at the Atlantic City convention in October. The meetings will be confined to manufacturers, and any particular recommendations which might be applicable to the association as a whole will be carried to the regular association meetings.

NON-FERROUS METAL MARKETS

The Week's Prices

Cents per Pound for Early Delivery

	May 17	May 16	May 14	May 13	May 12	May 11
Lake copper, New York....	13.12½	13.12½	13.12½	13.12½	13.12½	13.12½
Electrolytic copper, N. Y.*..	12.75	12.75	12.75	12.75	12.75	12.75
Straits tin, spot, New York.	67.00	66.62½	....	67.30	67.37½	67.80
Lead, New York.....	6.65	6.65	6.70	6.70	6.70	6.70
Lead, St. Louis.....	6.30	6.30	6.40	6.40	6.40	6.40
Zinc, New York.....	6.35	6.40	6.42½	6.45	6.45	6.47½
Zinc, St. Louis.....	6.00	6.05	6.07½	6.10	6.10	6.12½

*Refinery quotation; delivered price ¼c. higher.

NEW YORK, May 17.—Further weakness in prices has appeared in all the markets except copper. Demand for the latter is light and prices are quite firm. A fair business has been done in tin at declining quotations. Lead has again been reduced and demand is light. In a practically stagnant market zinc quotations are nominally lower.

Copper.—Statistics for April, which appeared the middle of last week, were not so favorable to producers as was expected. Although total stocks of refined and blister copper decreased during the month over 14,200 tons, the decline in refined stocks being about 4200 tons, there was an increase in the output at the mines. The latter was entirely unexpected. Exports were 55,520 tons, the largest for any month this year. The fact that the net curtailment in production was less than expected put a damper on the moderate amount of buying for both domestic and foreign use which was under way. Since then the market has been exceedingly dull, but there has been practically no decline in quotations which remain fairly firm at 13c., delivered in the Connecticut Valley, for electrolytic copper. A few sales slightly under this level by second hands are noted. There has been no change in the official quotation of Copper Exporters, Inc., which stands at 13.35c., c.i.f. Hamburg. Lake copper is quoted unchanged at 13.12½c.

Tin.—Sales for the week ended Saturday are estimated at close to 1000 tons. Consumers were not active buyers except on Friday, May 13, when they took several parcels. Yesterday, Monday, was an active day with 400 to 500 tons changing hands. It was mostly speculative selling with dealers trading in and out. Consumers, however, bought futures quite freely. Today the market has been moderately active with spot Straits tin scarce and quoted at 67c., New York. A good business was done in futures. London quotations today were from £5 to £7 per ton less than a week ago, with spot standard quoted at £290 15s., future standard at £283 5s., and spot Straits £305 15s. The Singapore price today was £290. Arrivals thus far this month have been 3965 tons with 4830 tons reported afloat. It is stated that supplies of 99 per cent tin are sufficient and that consumers are well covered. As a result sellers have been offering the metal down until it is obtainable at 4c. under the quotation for spot Straits and even below import cost.

Lead.—The American Smelting & Refining Co., late yesterday, Monday, reduced its New York contract price to 6.65c. The outside market had practically reached this level and today the metal can be bought from independents at 6.30c., St. Louis, or 6.65c., New York, the prices being nominal. Demand is by no means active.

Zinc.—Demand is almost entirely absent and prices have sunk to lower levels. As one seller puts it, there appears to be no bottom to the market. Specifications on contract are reported to be fairly good, but there is almost no new buying. Some small business in prime Western has been done as low as 6.05c., St. Louis, but the metal is reported to be available today at 6c.—a quotation which is entirely nominal. Ore prices at Joplin declined again to $38 per ton on Saturday, with output reported undiminished.

Antimony.—Demand is very poor and prices are a little lower with Chinese metal quoted at 12.50c. to 12.75c., New York, duty paid, for all positions.

Nickel.—There is no change in quotations and wholesale lots of ingot nickel are quoted at 35c. with shot nickel at 36c. and electrolytic nickel at 39c. per lb.

Metals from New York Warehouse

Delivered Prices Per Lb.

Tin, Straits pig	68.50c. to 69.50c.
Tin, bar	70.50c. to 71.50c.
Copper, Lake	14.25c.
Copper, electrolytic	14.00c.
Copper, casting	13.50c.
Zinc, slab	7.12½c. to 8.12½c.
Lead, American pig	7.87½c. to 8.37½c.
Lead, bar	10.00c. to 11.00c.
Antimony, Asiatic	15.50c. to 16.00c.
Aluminum No. 1 ingot for remelting (guaranteed over 99 per cent pure)	29.00c. to 30.00c.
Babbitt metal, commercial grade	30.00c. to 40.00c.
Solder, ½ and ½	42.00c. to 43.00c.

Metals from Cleveland Warehouse

Delivered Prices Per Lb.

Tin, Straits pig	72.50c.
Tin, bar	74.50c.
Copper, Lake	14.00c.
Copper, electrolytic	14.00c.
Copper, casting	13.25c.
Zinc, slab	8.00c.
Lead, American pig	7.75c.
Antimony, Asiatic	17.50c.
Lead, bar	9.50c.
Babbitt metal, medium grade	22.50c.
Babbitt metal, high grade	77.50c.
Solder, ½ and ½	44.00c.

Rolled Metals from New York or Cleveland Warehouse

Delivered Prices, Base Per Lb.

Sheets—	
High brass	18.12½c. to 18.87½c.
Copper, hot rolled	21.75c. to 22.75c.
Copper, cold rolled, 14 oz. and heavier,	24.00c. to 25.00c.
Seamless Tubes—	
Brass	23.00c. to 24.00c.
Copper	23.75c. to 24.75c.
Brazed Brass Tubes	25.87½c. to 26.87½c.
Brass Rods	15.87½c. to 16.87½c.

From New York Warehouse

Delivered Prices, Base Per Lb.

Zinc sheets (No. 9), casks	11.00c. to 11.25c.
Zinc sheets, open	12.00c. to 12.25c.

Non-Ferrous Rolled Products

Mill prices on lead full sheets were reduced ¼c. per lb. on May 16, and are now quoted at 10.25c. to 10.50c. Bronze, brass and copper products have not changed since April 7, and zinc sheets are still being quoted at the reduction of April 25.

List Prices. Per Lb., f.o.b. Mill

On Copper and Brass Products, Freight up to 75c. per 100 Lb. Allowed on Shipments of 500 Lb. or Over.

Sheets—	
High brass	18.12½c.
Copper, hot rolled	21.75c.
Zinc	9.75c.
Lead (full sheets)	10.25c. to 10.50c.
Seamless Tubes—	
High brass	23.00c.
Copper	23.75c.
Rods—	
High brass	15.87½c.
Naval brass	18.62½c.
Wire—	
Copper	15.00c.
High brass	18.62½c.
Copper in Rolls	20.62½c.
Brazed Brass Tubing	26.12½c.

Aluminum Products in Ton Lots

The carload freight rate is allowed to destinations east of the Mississippi River and also allowed to St. Louis on shipments to destinations west of that river.

Sheets, 0 to 10 gage, 3 to 30 in. wide	35.50c.
Tubes, base	45.00c.
Machine rods	34.00c.

Rolled Metals, f.o.b. Chicago Warehouse

(Prices Cover Trucking to Customers' Doors in City Limits)

	Base per Lb.
Sheets—	
High brass	19.12½c.
Copper, hot rolled	21.75c.
Copper, cold rolled, 14 oz. and heavier	24.00c.
Zinc	11.00c.
Lead, wide	10.25c.
Seamless Tubes—	
Brass	24.50c.
Copper	25.25c.
Brazed Brass Tubes	28.37½c.
Brass Rods	15.87½c.

Aluminum.—Virgin metal, 98 to 99 per cent pure, is quoted at 25c. to 26c. per lb., delivered.

Non-Ferrous Metals at Chicago

May 17.—The demand for copper is fair and the prices are steady. Tin, lead, zinc, and antimony are quoted lower in a dull market. The old metal market is without feature.

We quote in carload lots: Lake copper, 13.25c.; tin, 69c.; lead, 6.45c.; zinc, 6.20c.; in less than carload lots, antimony, 14c. On old metals we quote copper wire, crucible shapes and copper clips, 10.25c.; copper bottoms, 9c.; red brass, 9c.; yellow brass, 7.25c.; lead pipe, 5.25c.; zinc, 4c.; pewter, No. 1, 34c.; tin foil, 43.50c.; block tin, 52c.; aluminum, 15c.; all being dealers' prices for less than carload lots.

REINFORCING STEEL

Week's Awards of 6000 Tons Include Large Philadelphia and St. Louis Projects

Awards of concrete reinforcing bars in the week totaling about 6000 tons included 2200 tons for sewer work in Philadelphia and 1800 tons for a sedimentation plant for St. Louis. Pending projects total more than 7000 tons, of which 3100 tons is for a viaduct in Los Angeles. Awards follow:

NEW YORK, 250 tons, post office garage, Thirty-fourth Street, to Concrete Steel Co.

ROCHESTER, N. Y., 100 tons, school No. 34, to a Buffalo maker.

CINCINNATI, 200 tons, shops for Cincinnati Car Co., to Pollak Steel Co.

INDIANAPOLIS, 400 tons, Masonic Temple, to Hugh J. Baker & Co.

CHICAGO, 100 tons of rail steel, hotel at 662 West Madison Street, to Calumet Steel Co.

HINE, MO., 1800 tons, sedimentation basin for St. Louis municipal waterworks, to Laclede Steel Co.

PORTLAND, ORE., 200 tons, garage for Meier & Frank, to Mercer Steel Co., local.

SAN FRANCISCO, 125 tons, five bridges for Yosemite National Park, for United States Bureau of Public Roads, to an unnamed San Francisco jobber.

CHICAGO, 300 tons, Insurance Exchange Building, to Olney J. Dean & Co.

GARY, IND., 250 tons, store building, to Truscon Steel Co.

INDIANAPOLIS, 100 tons, State road work, to Olney J. Dean & Co.

PHILADELPHIA, 2200 tons, municipal sewer work, to Truscon Steel Co.

Reinforcing Bars Pending

Inquiries for reinforcing steel bars include the following:

JERSEY CITY, 500 tons, building for Yale Electric Co.; general contract not let.

ASBURY PARK, N. J., 100 tons, Y. M. C. A. building; general contract not let.

BUFFALO, 100 tons, school No. 29; bids asked.

CHICAGO, 400 tons, Meles Hotel.

CHICAGO, 900 tons, Ribach Building; Paschen Brothers, general contractors.

DECATUR, ILL., 500 tons, viaduct for the city.

ALTON, ILL., 410 tons, two bridges, across the Mississippi River, base and superstructure, 290 tons, and across Missouri River, base and superstructure, 120 tons.

OAKLAND, CAL., 250 tons, garage, Fourteenth and Harrison Streets; bids in.

OAKLAND, 100 tons, apartment building, Lake and Madison Streets; bids being taken.

LOS ANGELES, 385 tons, warehouse in the Central Manufacturing District; W. P. Hill Co., general contractor.

Old Metals, Per Pound, New York

The buying prices represent what large dealers are paying for miscellaneous lots from the smaller accumulators, and the selling prices are those charged consumers after the metal has been properly prepared for their uses.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, heavy crucible	11.00c.	12.50c.
Copper, heavy and wire	11.00c.	12.00c.
Copper, light and bottoms	9.25c.	10.75c.
Brass, heavy	7.00c.	8.50c.
Brass, light	6.00c.	7.50c.
Heavy machine composition	8.75c.	10.125c.
No. 1 yellow brass turnings	7.75c.	8.50c.
No. 1 red brass or composition turnings	8.00c.	9.00c.
Lead, heavy	5.00c.	5.625c.
Lead, tea	4.00c.	4.50c.
Zinc	4.00c.	4.25c.
Sheet aluminum	14.50c.	16.50c.
Cast aluminum	14.50c.	16.50c.

LOS ANGELES, 300 tons, apartment building, 5200 Hollywood Boulevard.

LOS ANGELES, 3100 tons, Glendale-Hyperion viaduct; Lange & Bergstrom, Los Angeles, general contractors.

RAILROAD EQUIPMENT

New York Central Orders 3500 Freight Cars—Total of 162 Locomotives Bought

With orders from the New York Central for 3500 freight cars, 60 locomotives and 175 passenger cars, together with 80 locomotives ordered by the Erie, the week's business in railroad equipment was the best in some time. The total number of locomotives bought was 162. Details follow:

The New York Central Railroad has ordered 3500 freight cars and other equipment. The orders for freight cars were divided as follows: 1000 steel hopper cars to the Standard Steel Car Co., 1000 steel gondola cars to the Pressed Steel Car Co., 500 steel gondola cars to the General American Car Co., 1000 steel box cars to the American Car & Foundry Co. It also ordered 60 Hudson type heavy passenger locomotives and 55 locomotive tenders from the American Locomotive Co. Orders for a total of 175 passenger cars of various types were divided among the following companies: Pullman Car & Mfg. Corporation, Standard Steel Car Co., Pressed Steel Car Co., American Car & Foundry Co. and Osgood Bradley Car Co.

The Cambria & Indiana has contracted with the Pressed Steel Car Co. for the repair of 300 hopper cars.

The Timken Roller Bearing Co. has ordered 6 steel gondola cars, three each from the Pressed Steel Car Co. and Canton Car Co.

The Lehigh & New England is inquiring for six 8-wheel switching locomotives.

The Central Railroad of New Jersey has ordered five Pacific type locomotives and 10 8-wheel switching locomotives from the Baldwin Locomotive Works. It has also ordered 25 coaches from the Bethlehem Steel Co.

The Youngstown & Northern has ordered two 6-wheel switching locomotives from the American Locomotive Co.

The Fruit Growers Express has ordered 300 steel underframes from the Ryan Car Co. and 50 from the Bethlehem Steel Co.

The Erie Railroad has awarded 80 locomotives as follows: 30 switching locomotives to the Baldwin Locomotive Works, 25 heavy road engines to the Lima Locomotive Works, and 25 heavy road engines to the American Locomotive Co.

The Chicago & Illinois Midland has placed two locomotives with the Baldwin Locomotive Works and repairs to 240 coal cars with the Ryan Car Co. It has also ordered six passenger cars from the Pullman Car & Mfg. Corporation.

The Louisville & Nashville will buy 250 gondola cars.

The Peoria & Pekin Union is in the market for three 8-wheel switching locomotives.

A second hearing was held in New York, April 26, before the United States Court of Customs at which the Henry L. Exstein Co., Inc., importer, 233 Broadway, New York, protested against the classification of reinforcing bars under paragraph 304 of the tariff act. A previous hearing was reported in THE IRON AGE of March 17, page 774.

Cold-Rolled Strip Steel Manufacturers Organize

What will probably be known as the Institute of Cold-Rolled Strip Steel came into existence at a meeting held in Pittsburgh last week of manufacturers representing almost all of the country's capacity for producing cold-rolled strip steel. The new organization

E. THEODORE SPROULL

GEORGE H. CHARLS

marks a definite departure from the ordinary trade association in that its primary functions are scientific rather than commercial and it is headed by a commissioner who will devote his entire time to the direction of its activities.

These activities will include research and investigation directed toward the development of new uses for cold-rolled strips; the reconstruction and reclassification of gages, sizes and differentials and the establishment of definite standards of quality that will be acceptable alike to buyer and seller. In short, the work of the new organization will be along lines calculated to put this branch of the steel industry upon a sound and stable basis.

E. Theodore Sproull, who has been general manager of sales Oliver Iron & Steel Corporation, Pittsburgh, is the commissioner. He was the unanimous choice of the membership but was able to accept the position only because Henry Oliver, president of the Oliver corporation, consented to release him. Mr. Sproull has been active in the steel industry in sales and executive capacities for 20 years. He began with the American Sheet & Tin Plate Co. He left that company to go with the Jones & Laughlin Steel Corporation in its tin plate sales department and severed that connection to go with the Trumbull Steel Co., Warren, Ohio, of which he was general manager of sales for several years and later assistant to the president. He joined the Oliver Iron & Steel Corporation as general manager of sales about six months ago.

A similar organization, known as the Hot-Rolled Strip Institute, which also takes the form of a research agency rather than of a regular trade association, was recently founded and G. H. Charls, formerly president United Alloy Steel Corporation, Canton, Ohio, was elected its commissioner.

Acquires Process for Manufacture of Aluminum from Common Clay

The Clay Reduction Co. of Chicago, Louis Birkenstein, president, has acquired of Segland Svendsen, formerly of Sarpsborg, Norway, his method for the manufacture of alumina. This method, which is particularly adapted for siliceous raw materials, such as common clay and bauxite of a high silica content, is said to bring a greater yield of alumina than methods now in use. It is stated also that a pure silica of very high porosity is obtained as a by-product.

Program Outlined for International Foundry Congresses

The holding of international foundry congresses, similar to those held in 1923 at Paris and in 1926 at Detroit, was the subject of a meeting in Brussels, Belgium, on Dec. 14 of an international committee composed of the various European foundry association representatives, according to the May *Bulletin* of the American Foundrymen's Association. There was no representative present of the A. F. A., but a communication was read from H. Cole Estep, chairman of the committee on international relations of the association.

It is stated that a splendid spirit of cooperation was shown and that after thorough discussion the plan was adopted of holding an international congress every three years, at which American foundrymen would participate, and of holding European congresses in the intervening years. The program as laid down is as follows:

1927—France	European Congress
1928—Spain	European Congress
1929—Great Britain	International Congress
1930—Belgium	European Congress
1931—Italy	European Congress
1932—Germany	International Congress
1933—Czechoslovakia	European Congress
1934—Spain	European Congress
1935—France	International Congress
1936—Great Britain	European Congress
1937—Belgium	European Congress
1938—United States	International Congress

The policy was adopted of limiting the number of exchange papers of one association to another to one for every year.

Announces Gift to Welding Society

Announcement of the award of a gold medal, the gift of Samuel Wylie Miller, to be made each year by the American Welding Society as an appreciation of work of outstanding merit in advancing the art and science of welding, was made at the annual dinner of that organization held in New York on April 28. The award is to be known as the Miller Medal.

S. W. MILLER

Mr. Miller, the donor, is consulting engineer for the Union Carbide & Carbon Research Laboratories, Inc., Long Island City, N. Y., and has been an outstanding figure in the advancement of welding since its commercial inception. He is a past president of the American Welding Society and a member of the American Society of Mechanical Engineers, the American Institute of Mining and Metallurgical Engineers and other engineering organizations.

The details of the administration of the award have not yet been decided upon, but F. M. Farmer, president of the welding society, in announcing the award, said that efforts would be made to follow out the intentions of Mr. Miller in helping to raise the quality of welding done by the average operator.

Outbound freight from Worcester, Mass., for the six months ended April 30 amounted to 179,867 tons, compared with 209,018 tons during the like period of 1925 and 1926, and 190,126 tons from Nov. 1, 1924, to April 30, 1925. During April 32,810 tons of freight was shipped from the city, a decrease of 18 per cent from the 39,800 tons moved in April, 1926. Up until November, 1926, figures of recent years were surpassed month after month, but since that time there have been decreases. The figures apply to railroad freight only, but there has been no material change in the percentage of goods moved by motor truck.

PERSONAL

J. W. Tomlinson, for seven years chief chemist of the Trumbull Cliffs Furnace Co., Warren, Ohio, has resigned to become associated with the Chicago Chemical Co., Chicago, and will serve that organization in its northeastern Ohio territory.

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Robert T. Kent, until recently superintendent of prison industries, State of New York, has been appointed general manager of the Bridgeport Brass Co., Bridgeport, Conn.

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H. P. McCullough and E. H. Crippen have been added to the sales organization of the Climax Engineering Co., Clinton, Iowa, and will represent the company in Texas. Mr. McCullough will have offices at 328 Chronicle Building, Houston, and Mr. Crippen at 4023 West Seventh Street, Fort Worth.

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Max Carsen has been appointed manager of the Chicago branch of the Unishear Co., Inc., New York, and will have headquarters at 549 West Washington Street.

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Frank J. Weschler, president and general manager Indian Motorcycle Co., Springfield, Mass., has resigned to become president, treasurer and general manager of the Baldwin Chain & Mfg. Co., Worcester. He succeeds as president, Wesley L. Kendall, who has held the office temporarily since March 1, and as general manager, William A. Rockenfield, who retires on account of ill health. Mr. Weschler also succeeds Mr. Kendall on the board of directors. Mr. Weschler was born at Erie, Pa., and entered the employ of the Pope Mfg. Co., maker of Columbia bicycles, in 1902. Since 1906 he has been connected with the Indian Motorcycle Co., for seven years in charge of sales, and successively as clerk, vice-president and treasurer, general manager, and finally general manager and president.

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James S. Nicoll, associated for 17 years with the Arthur J. O'Leary & Son Co., Chicago, has been elected vice-president of the company. He has been assistant secretary for several years.

—

E. R. Wyler, who has been connected with the Cleveland sales branch of the Independent Pneumatic Tool Co., Chicago, has been transferred to the sales department of the company's general offices and will make his headquarters at St. Paul, Minn.

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Walter L. Graser, sales engineer at Omaha, Neb., for the Truscon Steel Co., has been made manager of the company's office at Tulsa, Okla.

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W. F. Barnes, for the last year a contracting engineer for the St. Louis Structural Steel Co., St. Louis, has been made president of the company to succeed Lyall L. Stuart, who has resigned to become connected with the American Tar Products Co., Pittsburgh. Mr. Barnes has had 15 years' experience in structural steel work, beginning as an apprentice draftsman with the Carnegie Steel Co. at Baltimore after his graduation from Kentucky State University as a mechanical engineer. He was a structural engineer in the refining department of the Texas Co. at Houston, Tex., for two and a half years, with the Union Iron Works, Los Angeles, for three years, and before joining the staff of the St. Louis Structural Steel Co. was for 18 months chief engineer and production manager for the Pennsylvania Car Co. at Beaumont, Tex.

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A. K. West has been placed in charge of the news service department of the Timken Roller Bearing Co., Canton, Ohio. He was formerly associate editor of the *General Electric Review* of the General Electric Co. at Schenectady, N. Y.

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Harry Scullin, president Scullin Steel Co., St. Louis, was unanimously reelected president of the Associated Industries of Missouri at the annual conference held last week in Sedalia, Mo.

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A. H. Frauenthal has recently joined the engineering staff of the Studebaker Corporation at South Bend, Ind. He was formerly chief inspector for the Chandler-Cleveland Motor Co.

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Webster C. Muck, associated for the last nine years with August Feine & Sons Co., Buffalo, has been placed in charge of the general outside business of the Batavia Steel Plate Construction Co., Batavia, N. Y. He was chief engineer of the Feine company for four years.

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E. Heinzerling, director of the Siemens-Schuckert Works, Ltd., Hamburg, Germany, has been made a member of the board of the Metals Coating Co. of America, 495 North Third Street, Philadelphia. Other directors and officers were reelected.

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William B. Senseman has been appointed Pacific Coast district manager at Los Angeles for the Combustion Engineering Corporation, Raymond Brothers Impact Pulverizer Co., the Ladd Water Tube Boiler Co. and the Heine Boiler Co., all subsidiaries of International Combustion Engineering Corporation, New York. He has been associated with the Raymond Company for the past 15 years and since 1917 has represented that organization on the Pacific Coast.

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L. E. Creighton, assistant to the president of the Union Drawn Steel Co., Beaver Falls, Pa., has been appointed vice-president in charge of operations. He became associated with the company in 1910 and was for some time head of the order and invoice department. Later he was made production manager, holding that position until the merger of the Union company with the Frasse Steel Works, Hartford, Conn., the Peerless Drawn Steel Co., Massillon, Ohio, and the Standard Gauge Steel Co., Beaver Falls, when he was made assistant to the president. Russell B. Barnett, since 1925 in the sales department of the Union Drawn Steel Co., has been made assistant to the general manager of sales. He entered the cold drawn industry as a salesman in the Philadelphia office of the Peter A. Frasse Co. in 1914, and two years later was made production manager of the Frasse Steel Works at Hartford. In 1923 he was made sales manager of the Frasse company, holding that position until the purchase of the company by the Beaver Falls organization.

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Joseph P. Carney, treasurer and majority stock owner of the Florence Stove Co., Gardner, Mass., has disposed of his interest in the company to Boston bankers. He has been treasurer and active head of the company since 1923.

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L. S. Longenecker has resigned as Pittsburgh district sales representative for the Vitrofrax Co., Los Angeles, to take a similar position with the Charles Taylor Sons Co., Cincinnati, manufacturer of fire clay, high alumina and sillimanite brick. He will cover western Pennsylvania, West Virginia and eastern Ohio and will retain his present office at 409 Bessemer Building, Pittsburgh.

April Sheet Steel Sales 15 Per Cent Below March

PITTSBURGH, May 17.—Independent sheet steel manufacturers, representing 72.3 per cent of the country's capacity, report sales for April of 292,960 net tons, against 345,900 tons in March; production of 316,100 tons, compared with 359,340 tons in March; and shipments of 300,858 tons, contrasted with 338,436 tons in March.

Unfilled orders at the end of April were 491,290 tons, a loss for the month of 19,634 tons. Sales were 95.6 per cent of capacity for April, which for all companies was 421,330 tons, and for the companies furnishing the statistics was 304,622 tons. Production was 103.1 per cent; shipments, 98.1 per cent; and unfilled orders, 160.2 per cent.

OBITUARY

ARTHUR S. HOOK, vice-president and treasurer of the Calumet Steel Co., Chicago, whose death on May 10 was announced in THE IRON AGE last week, was born at Ottawa, Ill., in 1868. He received his grade and high school training at Ottawa, and began his business career as a teller in the First National Bank of that place. He then served as treasurer of the Moline Plow Co., Moline, Ill., but returned to Ottawa in 1901 to become treasurer of the J. E. Porter Co., manufacturer of farm implements. In 1903 he was appointed secretary of the Inland Steel Co., Chicago, remaining with the company until 1907 when he helped organize the Calumet Steel Co. He became vice-president and secretary of the new company at its formation. Quiet-mannered but genuinely cordial in his relations with others, Mr. Hook possessed a charm that won him a high place in the esteem of the steel trade. He was a member of the American Iron and Steel Institute, of the American Society for Testing Materials and of the Rail Steel Products Association. He was also prominent in civic and social life in Chicago and Oak Park.

ARTHUR S. HOOK

HAROLD V. MORSE, well known in the sheet steel jobbing business at Cleveland, died May 14 of pneumonia. He was formerly affiliated with the Morse-Rogers Steel Co., Cleveland steel jobber, which was established by his father, the late F. H. Morse, but about a year ago he withdrew from that organization and opened offices in the Rockefeller Building for the sale of sheet steel under his own name.

ADOLPH HEINZ, secretary and treasurer Dayton Malleable Iron Co., Dayton, Ohio, died May 9. He was 64 years of age, and had been associated with the company for 45 years.

WALTER R. GREEN, founder and president of the International Stamping Co., 400 North Levitt Avenue, Chicago, died, May 12, at his home in that city, aged 68 years.

FRANCIS J. CLAMER, founder of the Ajax Metal Co., Philadelphia, died Monday at his home at Collegeville, Pa., at the age of 87. He arrived in Philadelphia at the age of 11 from Hamburg, Germany, where he was born, and upon attaining young manhood studied the science, becoming a gold and silversmith. In 1868 he achieved important results in the production of anti-friction metals. At the age of 60 he retired from a business he had developed to large proportions and it has since been conducted by his son, G. H. Clamer, known internationally as a metallurgist.

WILLIAM SELFRIDGE, Philadelphia, who was engaged in the iron and steel business for more than 50 years, died on Wednesday, May 11, at his home in Philadelphia at the age of 70. Before his retirement from active business some years ago he was president of William Wharton, Jr., & Co. and the Philadelphia Roll & Machine Co. and a director of the Tioga Iron & Steel Co. up to the time these companies became a part of the Taylor-Wharton Iron & Steel Co., High Bridge, N. J. He served as chairman of the executive board of the latter company. He was also vice-president of the American Manganese Mfg. Co., retiring in 1922.

BENJAMIN ATHERTON HAWLEY, vice-president American Hardware Corporation and general manager of the Russell & Erwin Mfg. Co. division, New Britain, Conn., died at his home in that city on May 10. He was born in 1868 and became associated with the Russell & Erwin company in 1882, later serving in the sales department of the New York office. He was transferred to New Britain as sales manager in 1902, and in 1907 was made a director of the American Hardware Corporation, shortly afterwards becoming general manager of the Russell & Erwin plant. He was elected vice-president of the corporation in 1911.

IRA HARVEY WOOLSON, consulting engineer on buildings for the National Board of Fire Underwriters, New York, and an authority on building codes, died on May 8 while on a visit to Chicago. He was born in 1856 and was graduated in 1885 from the school of mines of Columbia University. From 1903 until 1910 he was adjunct professor of mechanical engineering at Columbia. He was the organizer of the National Board of Fire Underwriters' committee on construction, and also served under Secretary Hoover as chairman of the building code committee of the Department of Commerce. He was a member of the American Society of Mechanical Engineers and of the American Society for Testing Materials.

HENRY Y. STUCKEY, chief engineer and production manager of the Alliance Machine Co. and secretary of the Machined Steel Casting Co., Alliance, Ohio, whose death on May 9 at Asheville, N. C., was mentioned in THE IRON AGE last week, had gone South to recuperate from an operation and from an illness extending over a period of two years. He was born near Alliance in 1872, and after receiving a common school education, taught school for a short period. Later he took a course at the Ohio Northern University, Ada. In 1893 he gave up teaching to become a drafting room apprentice and in 1902 entered the employ of the Alliance Machine Co. in its engineering department. He was one of the organizers of the Machined Steel Casting Co. and as secretary was active in its operation.

HENRY Y. STUCKEY

British Iron and Steel Output in April Still Larger

LONDON, ENGLAND, May 14 (*By Cable*).—The production of pig iron in April was 680,000 gross tons and that of steel ingots was 850,100 tons. In March, the pig iron output was 671,800 tons and steel was 949,600 tons.

The comparison of the January, February, March and April production with the monthly output in recent years is shown by the following table in gross tons:

	Pig Iron, Tons	Steel Ingots and Castings, Tons
1913—Average monthly...	855,000	638,600
1920—Average monthly...	669,500	755,600
1922—Average monthly...	408,500	490,100
1923—Average monthly...	620,000	706,800
1924—Average monthly...	609,900	685,100
1925—Average monthly...	519,700	616,400
1926—Average monthly...	203,500	296,700
1927—January	434,600	730,700
1927—February	567,900	819,100
1927—March	671,800	949,600
1927—April	680,000	850,100

The steel production in April at 850,100 tons was less than March but was the second largest this year, the decline being due in part to the Easter holidays.

Live Topics in British Program

(*Continued from page* 1448)

Based on the assumption that the capital costs in England were £4 5s. in 1890 and £6 15s. in 1912 per ton of output, and taking the low figure of 8 per cent to cover both repairs and depreciation, it means that the charge for depreciation was 10s. 9d. per ton of output in 1912, as against 6s. 9d. in 1890—an increase of 4s. This is equivalent to 3 per cent on the capital invested in 1912, and if we include the modest return of 5 per cent as interest on the capital invested, the charge per ton of product becomes 17s. 6d., whereas the charge in 1890 would have been only 11s. per ton. This does not allow for any interest on working capital as distinct from capital invested in plant. The costs today are much higher than in 1912.

Justifying Expenditure on Plant

Expenditure on plant may be justified if it reduces manufacturing costs or if it is brought about to satisfy the demand for an improvement in quality or results in a greater variety of products. The gradual replacement of the basic Bessemer process by the basic open-hearth process is a case in point, while another case is that of the replacement of the old beehive coke oven by the modern by-product coke oven.

The capital cost of the modern coke-oven plant per ton of annual production was in 1912 about 13s. per ton as against 3s. per ton for the old beehive type of oven, but the greatly increased yield of coke, the recovery of by-products, and general reduction in working charges, have justified the increased expenditure.

The real question, however, is not the actual expenditure, but the relation which the expenditure bears to the costs of production. It is a reflection on steelworks practice that, not only in England but all over the world, the capital cost per ton was considerably higher in 1912 than in 1890. In Mr. Harbord's opinion, a common defect in iron and steel plants is the lack of balance—so much money usually being spent on one part of the plant that it is impossible, for financial reasons, to modernize the plant as a whole. In some plants the open-hearth and mills are of the latest design equipped with the most modern appliances, while the coke ovens and blast furnaces are insufficient in number to meet the requirements of the steel plant, or are old and working under conditions which make it impossible to produce pig iron economically. Opinions are divided as to the advisability of spending money at the blast furnaces to produce a suitable pig iron as against spending money in the open-hearth to do the work which should be done at the blast furnace.

In view, however, of the general European and American opinion, as expressed in their works practice, that it pays to supply the steel department with a low-silicon, low-sulphur iron, Mr. Harbord submitted that the question should be carefully reconsidered, to see if on balance there is not more to be gained by the blast furnace producing a special iron of this kind, rather than by requiring the open-hearth department to use a pig iron which is not best suited for the purpose.

Mr. Harbord suggested that English blast-furnace practice might be improved by following the American practice of blowing by volume instead of by pressure, by crushing the ores to pass a 3-in. ring, and by giving greater attention to detail in charging the furnace, to the combustion of the gas in hot-blast stoves, and to controlling the temperature of the blast.

The economic size of the plant largely depends upon the special conditions, and provided the output is large enough to carry the necessary overhead charges to maintain a staff of the best technical and commercial men available, little if anything is to be gained by increasing the size. Of more importance than size is that the plant should be well balanced, so that it is as self-contained as possible, and that it should specialize in one particular class of finished material.

Suggests Ideal Combination

The ideal combination suggested by Mr. Harbord would be a group of works, each being specially designed to produce a particular product, such as rails, sections, billets, sheet bars, plates, etc., each managed independently as a separate unit, and of such a size that each could carry overhead charges sufficient to enable the best men available to be secured both for commercial and technical management, but all the works being linked up to a central purchasing and selling organization.

Under such an arrangement the success of each works would depend upon its efficient management, and it would be possible to operate in normal times to something approaching full capacity under the most favorable manufacturing conditions. All competition for orders for the same material would be eliminated, and the only competition between the different works would be to see which could show the best balance sheet.

To insure success, it would be absolutely essential to obtain the control of raw material sufficient to meet, if not in full at least in part, the requirements of each of the works, so that the combination to a large extent would be independent of outside supplies.

Comments on the Address

Sir William Peter Rylands, in moving a vote of thanks to the president for his most interesting address, said he had covered a large field and had most appropriately drawn attention to a vast range of points which had to be examined to see that "our house" was in order. The president very properly laid great stress upon a matter which, he thought, had often been lost sight of, and that was the definite relationship between turnover and capital. It was a crucial point and very rarely borne in mind. Sometimes large expenditure was incurred in the fond hope that it would be remunerative; but, after all, success depended on the relationship between capital and turnover, and he believed some commercial thinkers at the present time were giving much thought to that problem and were realizing how much it meant.

Papers on Blast Furnace, French Industry, and Manganese

FOUR papers were presented after these preliminary ceremonies: One on the blast furnace, one on the metallurgical industry of eastern France and two on manganese.

Interaction of Gases and Ore in the Blast Furnace

PROFESSOR WILLIAM A. BONE, Drs. L. Reeve and H. L. Saunders, Imperial College, London, surveyed, in the paper of the foregoing title, at the request of the National Federation of Iron and Steel Manufacturers' fuel committee, the first two years' work upon the interactions of the furnace gases and ores at temperatures up to 650 deg. C.

Calcium Chloride-Dried Gases Used

An outstanding new fact which has emerged from experiments with calcium chloride-dried gases is that at each temperature the reducing reactions always predominate during the initial stage of ore reductions, coming into play only after a certain amount of oxygen, according to the temperature, has been removed. Once carbon deposition has begun, however, it proceeds at a rapidly accelerating rate, as oxygen is progressively removed from the ore, while the rate of ore reduction is concurrently decelerated, until eventually a certain stage of reduction is arrived at, dependent mainly on the temperature, but also to a less extent upon the nature of the ore, after which practically all the usable carbonic oxide is utilized in "carbon deposition," and practically none of it in "ore reduction." With a temperature at 380 deg. C., the physical nature of the ore appears to be a factor which cannot be ignored when considering its behavior toward the gases in a blast furnace.

The investigations seem to show that 650 deg. C.

is the upper temperature limit for the occurrence of any marked "carbon deposition" as the result of the reversible $2\,CO = C + CO_2$ reaction in the furnace. Probably it will not altogether cease at higher temperatures toward the ultimate stage of ore reduction, but its influence upon the furnace reactions generally will be relatively small, and in particular it will impose no limit on ore reduction.

Hydrogen Has Marked Effect

A small amount of hydrogen (one-sixth of which was permanently converted into water during each experiment) materially increased the proportion of the original CO used in "ore reduction" and diminished that used in "carbon deposition" at all but the initial stages of deoxidation. The resultant effect of this was to raise the ore reduction limit (at a temperature of 550 deg. C.) from 37.4 to 66.7 per cent.

If it be thought worth while, and the necessary support is forthcoming from the industry, it is hoped eventually to lay a sound foundation of ascertained data concerning the interaction between furnace gases and the materials comprising the charge, at all temperatures between 380 deg. C. and the highest which can be attained on an experimental scale.

Discussion

Professor Armstrong thought that no more appropriate paper could have been read, following the presidential address, because reading between the lines he judged that Mr. Harbord was dissatisfied with the present condition and knowledge of the industry. He ventured to say that the paper showed that nothing was known of the chemistry of the blast furnace and that everything had to be learned. It seemed to him, however, to be the most important contribution to the subject that had been made since Lowthian Bell dealt with it.

Addition of Hydrogen Very Interesting

The question of the addition of hydrogen was very interesting, said E. H. Lewis. His own firm had carried that point very much further, because only on the previous day, in the top of the furnaces with which he was connected, there was 9 per cent and not 2 per cent of hydrogen. It must be understood that in Scotland, the gases in the upper part of the furnace were really a mixture of the blast furnace and coke oven gases because raw material was being used.

It seemed to him that, after the author's investigations had been carried a certain length, it would be necessary for people in Scotland to get the investigations continued with the object of dealing with the quite exceptional conditions that prevailed there.

Stresses Importance of Problem

James Henderson said he desired to stress the importance of the subject to the industry—in this country in particular. Great progress had been made in other directions, for instance, in rolling mills in which it had been possible to effect considerable economies, but there could be no doubt the blast furnace offered the biggest field at the present time for improvement from an economical point of view.

The thermal efficiency of the blast furnace was notoriously bad, and he did not think Professor Armstrong had expressed the opinion too strongly when he said that the industry ought to know a great deal more of what was going on inside the furnace than they did at the present time. He thought a debt of gratitude was due to the National Federation and to its fuel committee, in particular to Mr. Mannaberg, for setting the investigations on foot.

What Is Happening in Middle of a Furnace

One of the difficulties which all the members realized, suggested J. E. Fletcher, was that of ascertaining what was happening in the middle of an apparatus of such large diameter as a blast furnace. They had been trying in the Cast Iron Research Association, in connection with tubular work, to obtain a good deal more information concerning smaller furnaces, and great difficulty had been experienced in obtaining information in a 30-in. or 40-in. diameter furnace. He was sure possibilities must exist of doing a great deal more work in connection with blast furnaces and thus assisting Professor Bone in his researches which were sure to prove of great value in the future.

Are Carbonyles Formed?

Prof. C. H. Desch said that Professor Bone, who had laid a great deal of stress on the question of carbon deposition, had been making experiments on a small scale with silica vessels in which the carbon was deposited naturally in a very fine form alone as fine ore. He thought it was the general opinion among blast furnace men that, in the actual furnace, it was necessary to avoid as far as possible those conditions which brought about carbon deposition on account of the danger of blocking the furnace. He thought all chemists were bound to attach a great deal of importance to the suggestion made by Professor Armstrong that carbonyles were formed. While carbon deposition might be a hindrance in blast furnace working, Professor Bone's results seemed to have an enormous importance in connection with the processes which were now being considered. If the ore could be permeated in such a simple manner with very finely divided carbon so that the next stage in the reduction was very much simplified, that seemed to be a point which should be borne in mind by all who were trying to develop direct processes.

Reduction by Carbon or Carbon Monoxide

Daniel Sillars said that Professor Bone, in the course of his interesting remarks, had called attention to the carbon deposition in the lower region of the furnace. It was somewhat difficult to see how, even if it was found that that could be encouraged or inhibited as occasion demanded, it would particularly benefit the operation of the furnace, unless the author had in mind that there was some obscure difference between reduction taking place by carbon monoxide and reduction taking place directly by carbon. He had always imagined that even in direct reduction the first operation was the formation of carbon monoxide in the lower region of the furnace, just as case hardening, the converse of that reaction, was generally attributed to the formation of carbon monoxide and the decomposition of the carbon monoxide.

As to Doctor Desch's remarks, he did not think the carbon deposition difficulty arose very much in this country, but it was a very important one in connection with the smelting of Mesabi ores where the deposition became so serious in many cases that the pressure developed to such an enormous degree that an arch of carbon formed in the interstices of the very fine Mesabi ores, with the result that when it eventually gave way the pressure was so enormous that it blew the bell off the furnace. Very little was known, he said, about the inner reactions of the blast furnace. There was, so to speak, a kind of average reaction taking place, and they had been satisfied with that since the days of Lowthian Bell.

Reduced Coke Consumption Necessary

It was necessary to bear in mind, remarked C. H. Ridsdale, that behind all the recent papers on blast furnace reactions, reactivity coke and that sort of thing, what should be aimed at was the desirability of getting reduced coke consumption, and he did not see anything in the paper pointing to that fact. Another point upon which valuable information might be given was that, if they could avoid too much carbon getting down in an intimate state of temperature with the ore into the hearth, they might be able to get the lower-carbon iron which foundrymen wanted to get plentifully and cheaply for the higher duty castings.

Subject Attacked on Right Basis

One of the most satisfactory features about the paper was that investigators had at least got on to the right and correct lines for attacking the whole subject, said Alfred Hutchinson. As practical blast furnace men they wanted to know whether they could get any help from researchers from the point of view to which Mr. Ridsdale had referred of reducing coke consumption. That could only be obtained if they really understood what was going on. The first thing to remember was that, whatever was going on, it must follow the

lines of proper chemical interaction such as could be studied in the first instance in laboratories only.

He congratulated the staff at the Imperial College of Science on the way in which they had carried on their great and wonderful research which had involved a tremendous amount of work to put it on a theoretical basis in order that those who were practically engaged in industry might have an opportunity later on of seeing how far what had been discovered could be applied to blast furnace work.

American Experts Send Opinions

At this point a lengthy discussion from the United States by T. L. Joseph and C. C. Furnas of the United States Bureau of Mines, Minneapolis, was read.

The Bureau of Mines has attacked its blast furnace problems in the laboratory and in the field on three main phases, said these Americans, in part: Gas velocities, heat transfer from gas to solid, and rate of the reactions involved. The work had been augmented by researches on the bureau's experimental blast furnaces and on several modern industrial furnaces, by studies covering observations on gas composition, temperatures, pressures, and gas velocities, on a series of planes. At the present time the fundamental laboratory study covering gas flow through a bed of broken solids was nearing completion. The experiments on pressure drop had been undertaken first because rates of reduction and heat transfer depended upon the distribution of the gas stream, that distribution depended upon the relative resistance to gas flow offered by various sections of the charge column.

It was hoped that active work on the rate of gas reactions would be started within a few months. It was planned to follow that with studies on heat transfer. The bureau had made a number of surveys across a series of planes, between the tuyere level and stock line, at which gas composition and temperatures had been studied. On a Southern furnace using lean ores complete data across a series of planes had been secured on gas compositions, augmented by a few temperature and pressure readings. During the past nine months the bureau had secured on a 700-ton Northern furnace, working on Mesabi ore, a set of data on gas composition, temperature, pressure, and gas velocity, at short intervals across a series of planes between the tuyere level and the stock line. Again it might be said that the work of Messrs. Bone, Reeve and Saunders was of considerable interest to the writers and it was hoped that their good work would be continued.

The Problem Is International

Prof. Carl F. Benedicks said there was no scientific problems so international and of such importance as the problem with which the paper dealt. There was no doubt that such a very deep scientific problem had to be solved first, and it was necessary to concentrate work on that problem before entering on practical details. What he especially admired in the paper was the beautiful circulation method that Professor Bone had used.

The Author Replies

Doctor Bone, in reply, said that, with regard to future work, which was a matter of practical importance, it would be observed the experiments embodied in the paper had taken two years to carry out. It was true that there were other experiments which were not dealt with in the paper, but the contribution contained at least 75 per cent of the work. They had not finished with the furnace reaction up to 650 deg. because so far they had dealt with the equilibria only and had still to deal with the more difficult and intricate question of relative velocity. They were working on that, but it would take a longer time than the study of equilibria. Then they wanted to go on to higher temperatures.

Heavy Metallurgical Industry of the East of France

PROF. J. SEIGLE, Nancy, France, presented a review of the heavy metallurgical industry of the east of France, consisting of (a) the Department of Meurthe-et-Moselle (in which there are three iron fields—Longwy, Briey, and Nancy), and (b) the Department of Moselle, which includes the ore deposits and plants west of the towns of Metz and Thionville.

In the Department of Moselle, all the works, with one exception, were originally German, but have been owned and worked by French companies since 1919. Certain plants, with blast furnaces only, produce foundry iron or steel-making pig only for sale. Others, equipped with blast furnaces to which are attached large foundries, produce in particular cast iron pipe.

The large steel works consist of a group of three to eight or ten blast furnaces, a basic steel works with three or five converters treating on the spot the liquid pig iron produced by the blast furnaces, and rolling mills. Some of these plants have, in addition, a basic open-hearth steel works; others have not and produce an excess of scrap iron and steel which they sell. There is not a single acid open-hearth furnace in use, nor is there a steel works with electric furnaces.

Output in 1926

The production of the two departments for 1926 (7,726,000 metric tons of pig iron) was 81.5 per cent of the total for the whole of France, while in the case of steel the production (6,011,000 metric tons) was 71.5 per cent of the French total production in 1926.

The majority of plants consist of moderately narrow but very tall coke-ovens, and one of the newest installations consists of 24 ovens, with chambers of the following dimensions: Width 0.36 to 0.40, height 3.90, length 12.57 meters. Many new installations have been designed so that they may be heated eventually either by clean gas from the blast furnaces, by a mixed gas (from the blast furnaces and the coke-ovens) or by producer gas.

The total number of furnaces in the two departments at the end of 1926 amounted to 151, of which 40 were not in blast. From the point of view of iron ores, and also of the technical perfection of the plants, the situation is considered very favorable. With regard to coke, matters are not so satisfactory, but are likely to improve on account of the development of the manufacture of coke in France.

The works in Meurthe-et-Moselle are laboring under heavy financial burdens due to the cost of the reconstruction of the works demolished during the war, while in Moselle the burdens arise out of the conditions concerned with the acquisition of works originally German and of the generally deplorable conditions of the metallurgical market in the years 1919 to 1923. These past burdens will become less heavy if metallurgical production develops favorably, and for that it is desired that good relationship may be established between all nations.

Comments by the President

The president said that unfortunately Doctor Seigle could not be present. The paper was an interesting one, containing a great deal of information with regard to the present economic condition of the industry.

The Metal Manganese and Its Properties

SIR ROBERT HADFIELD gave, in his paper with the foregoing title, a general historical account of the metal manganese and its uses and showed the interesting way in which the production and use of ferromanganese was brought about. He also gave some account of the present world position as regards the resources of manganese ores, more particularly from the British point of view.

United States Obtaining Russian and African Ore

He pointed out that the United States is now drawing large supplies of manganese ores from Russia, and is about to develop on a large scale newly acquired interests in Africa. Great Britain is developing her Imperial resources in India, the Gold Coast, and South Africa; France, Germany and Belgium derive their ores from a variety of sources.

No one country making steel on a large scale possesses the necessary supplies of manganese ore with which to make its steel, and all are dependent on outside sources.

With regard to the production of ferromanganese in the electric furnace, Sir Robert pointed out that, while

a purer product is yielded by electric processes, the latter are not very efficient in other respects, and that the cost of ferromanganese produced in such circumstances is higher than that of the blast furnace product.

Discussion

Sir Thomas Holland said that the questions raised by the author had a direct bearing upon certain problems to be discussed at the forthcoming Congress in Canada of the Mining and Metallurgical Institute, and definite resolutions were being framed for submission at that congress.

Two Main Questions to Be Considered

The two main questions to be considered in regard to manganese ore supplies were (1) whether we were shaping our economic policy so as to insure adequate supplies for our future steel requirements, and, (2) what should be done to secure supplies in the event of ocean transportation being interrupted during a war. British requirements are in the neighborhood of a quarter of a million tons of high-grade ore every year.

War Reserve for America

Great interest was shown in this question in America, where it had been suggested by a commission of inquiry that a war reserve of 600,000 tons of high-grade ore should be created and serious research undertaken with a view to providing effective substitutes. These proposals, he said, were not merely of academic interest, and their seriousness should be a lesson to Great Britain.

He also raised the question as to whether Great Britain could always rely upon getting ores from the rest of the Empire and he mentioned that at any time Indian politicians might ask why their country should be depleted of its resources in the interest of the "foreign" steel smelter. Sir Thomas urged that the Iron and Steel Institute should not confine itself to purely technical matters and leave politicians to do the rest, and he suggested that the question of manganese ore supplies was eminently one which should occupy the attention of technical men.

Information on African Deposits

Col. H. T. Levey of the Gold Coast Colony Trade Bureau said that deposits in the Gold Coast were being worked at full speed, but lack of transport facilities were hampering development. This difficulty was being steadily overcome and it was hoped that by March of next year to ship at least 50 per cent more ore than was being shipped at present. In addition to existing deposits, considerable areas rich in manganese ore had been discovered in the Gold Coast. At present it was not possible to work these owing to their great distance from the railroad, but when the line was extended in the north it would be possible to develop these deposits.

He said that America had been endeavoring, for a long time past, to obtain concessions for working deposits in the Gold Coast, but he added that no concessions had been granted and that none were likely to be granted despite the very keen interest which Americans were showing in the Gold Coast deposits.

Kilburn Scott thought there was no occasion to fear that supplies would fail and that fresh discoveries would be made in the future as in the past, but perhaps in a different manner. Many deposits were not discovered earlier simply because they were covered with a growth peculiar to tropical countries.

Storage of Ore Urged for Britain

He was glad to hear that Americans had not got control of the ore in West Africa, but they had got the Caucasus and were close up to South Africa, while in Brazil they had the largest deposits in the world. He urged that Great Britain should bring large supplies of manganese ore into the country and store them in the same way as it was proposed to do in the United States.

Low-Carbon Iron-Manganese Alloys

Under the title, "Alloys of Iron and Manganese Containing Low Carbon," Sir Robert Hadfield presented the results of an extensive research. The paper, exclusive of several plates of photomicrographs and 17 folded charts, covers 65 pages of type. This paper of the same title, presented at the Cleveland meeting on "Manganese," under the auspices of the Ohio section of the American Institute of Mining and Metallurgical Engineers, April 19, was the institute paper in an abridged form. An abstract of the Cleveland paper was published in THE IRON AGE, April 14, page 1094. This will suffice for the present, though the original paper is much more elaborate.

Discussion

Dr. Walter Rosenham considered the research of considerable importance, but he uttered a warning that, until the ternary field had been more fully explored, it would be difficult to offer any real meaning of the complicated phenomena described in the paper. It was important to know that carbon played an important part in manganese steel.

Dr. W. H. Hatfield asked whether low-carbon affected wear resistance, and pointed out that the best steels produced for cutting purposes were either without manganese or with only slight traces of manganese.

Sir Robert Hadfield, in reply, said that low-carbon materials did not offer very high resistance to wear.

(To be continued)

Training of Owners' Sons

(*Concluded from page* 1440)

trips to other manufacturers. On the completion of his work, before taking the responsible position that may be planned for him, a trip abroad would be a great help. He would there see other ways of manufacturing and get points of view that would broaden him and make him still more helpful in his position.

In outlining this work, I have in mind three specific ends:

1—A working knowledge of the details of the business, both in its mechanical operation and in its executive lines.

2—Discipline. I firmly believe that no man is equipped to undertake to take charge of help excepting he himself has undergone a thorough training that involves discipline. If the young man is equipped to follow on as the leader of the business he will have occasion to observe, during his shop training, the necessity of a proper discipline, and his own obedience to it is a necessary preparation to carry on in his life work.

3—With it all, a knowledge of men through personal contact; I reiterate this because I lay such importance upon it.

We are prone to think that times have changed, which is true. But really the thing that is bothering us is that we are individually living on a different plane today from that which we started with, and we dread putting the youngsters through that hard experience.

Always keen, competition grows keener as we go on. Those who are to take the responsibility must be prepared to meet this keener competition, to say nothing of the many problems constantly arising in the labor situations that are changing almost monthly.

Shipments of electric industrial trucks and tractors in April included 101 units for domestic service and four for export. Twelve of the domestic units were tractors and 89 of other types. The total for four months is considerably below last year, aggregating 449 in all, against 485. Of the total this year 39 tractors were for domestic use, with 372 of other types, while 38 units are for export.

Machine Builders' Jubilee Meeting

(*Continued from page* 1450)

is considerable competition. These matters would affect the selling price without perhaps having any influence on the cost, and thus would have their effect upon the total billings.

He pointed out that the machine tool industry has in general developed in the past few years from a profitable industry into one which is non-profitable or of low average profits. It varies in its constituent factors according to how much dependence is placed on material costs of the foundry output and cost of workmanship. He believes that the industry is spending too much money on improvement of machines with a view to giving the purchaser a greater return upon his investment, without increasing sales prices correspondingly with increased costs. This situation he laid to a lack of the cooperation formerly experienced and which must be again a feature. "We do not take the action with regard to prices that common-sense men ought to take."

L. S. Horner, Niles-Bement-Pond Co., New York, stated that the business is in a serious condition from the standpoint of an industry. Manufacturers of standard lines of tools are selling either at a loss or at a margin of profit which the speaker characterized as ridiculous. He blamed this great trouble on a lack of confidence in each other. Like Mark Twain and the weather, the members discuss things and then do nothing.

There is a lamentable lack of facts available as to what is happening in the industry. The members do not give adequate information confidentially to a central source, where the data may be tabulated.

As a constructive suggestion, Mr. Horner pleaded that the members report through Mr. DuBrul's office, confidentially, each month the amount of orders received, the amount shipped and the amount of unfilled orders at the end of the month. As supplementary information, he asked that the profits or losses of each concern, for tabulation by groups, be reported every six months, together with the number of men employed in productive work and those on non-productive work. On the basis of information compiled in this manner, the industry would *know* whether it is making a fair profit or not.

Selling Below Cost

Nothing has been done with the reports of certified public accountants suggesting what should be included in the compilation of cost figures. The speaker believes that the industry in many cases is selling now at 10 to 15 per cent under a fair cost, as so determined. He pleaded for an effort to get into the cost figures all the items which properly go into costs. Then, with costs accurately known, "make no bid less than cost plus a reasonable profit. This cost should be about 30 per cent on the selling price—not the capital—to be about right."

As a fourth suggestion, Mr. Horner said "Make a price and then stick to it."

President Gleason referred to the foregoing recommendations as group problems, and stated that the association would take the recommendation of the groups in dealing with them. Mr. DuBrul placed the top limit of a price which can be charged as proportional to the productivity of the machine to the buyer. In general, a modern type of machine is likely to pay the owner a higher dividend than he can get through any other investment.

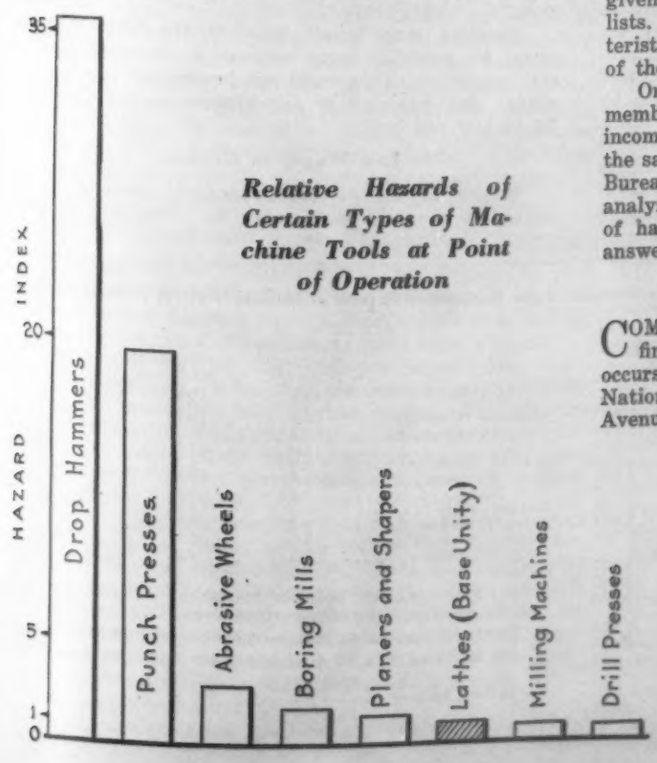
Inventory Ratios Discussed

Discussing further the question of capital investment, and particularly the large amount of inventory, which was suggested at $400,000 on a production of $1,000,000 a year, Mr. DuBrul stated that the ratio was determined from returns of the companies in the association. It was brought out that the association members make up about 80 per cent of the productive capacity of the entire machine tool industry. In 1923 there were 27 companies which sent in their figures for turnover percentages from 1911 to 1922 inclusive. The dollar values were not given.

These ratios for the three pre-war years, 1911, 1912 and 1913, averaged close to the figure taken by the committee in its analysis. They were respectively 2.45, 2.82 and 2.54. The figure dropped in 1914 to 1.67 and then jumped to 4.02 in 1915. Succeeding years showed 4.98 in 1916, 5.26 in 1917, 5.41 in 1918, 4.12 in 1919 and 3.46 in 1920. Because of the exceedingly bad business of 1921 this figure dropped to 0.64, followed by 0.98 in 1922. The figures above given are simply averages of a series of percentage figures. They are not weighted averages in any sense, as the dollar values were not known.

Numbers of machines shipped by 29 companies, members of the association, during those same years, produced a curve which paralleled very closely the curve of inventory turnover from the figures above given. Only seven companies were represented in both lists. Apparently, therefore, the figures are characteristic and may be taken to represent a cross-section of the industry.

On motion of Mr. Horner it was agreed to ask the member companies to furnish Mr. DuBrul with their income figures for 1920 to 1926 inclusive, by years, in the same form as given in reports to the United States Bureau of Internal Revenue. These returns will be analyzed in time for the October meeting. On a show of hands, 29 companies expressed their readiness to answer such a confidential questionnaire.



Relative Hazards of Certain Types of Machine Tools at Point of Operation

Safeguarding of Machines

COMPENSATION represents only one-third of the final cost of an accident to a plant in which it occurs, according to G. V. Fuller, assistant secretary National Council on Compensation Insurance, 151 Fifth Avenue, New York. Distraction of the other operatives, making them produce sub-normal quantities and qualities, and the cost of training a new man to take the place of the man laid up are other large elements in the cost of the accident.

Mr. Fuller's analysis of accidents in machine shops was based on a total of 31 fatal and 433 non-fatal cases of serious accidents, in which the aggregate indemnity cost reached $912,646. The tabulation showed the accident by class of machine involved and then subdivided those accidents into the ones occurring at the point of operation of the tool and those from other features of the machine, including

the driving device and other moving parts. It was found that the point of operation was responsible for a large share of the trouble. The specific character of injury and method of its receipt were detailed in the table. Table I is a resumé of the principal features in that presented before the meeting.

Standardization of safety codes has been conducted by the American Engineering Standards Committee. Wherever a tool produces a hazard at the point of operation, a standardized safety code should be considered for it. There are standard codes now in effect on abrasive wheels and on punch presses, which are among the worst hazards in the machine tool list. It has been found that three per cent of the total number of accidents results in one-third of the total cost of accidents, and it is only these most serious ones which were covered in the table. The average compensation cost per case was about $2,075. Of the 464 accidents analyzed, 395 cases referred to the point of operation and 69 otherwise.

Relative Machine Hazards

Analyzing the accident severity as a function of the number of machines in operation, which was done as in Table II, it is found that drop hammers form the most hazardous of all the equipment listed, in proportion to use. Estimating the lathes, which are the most numerous of all machines, at unity index, the other indices were worked out on the basis of the proportionate distribution, by percentage, of the number of machines and the number of serious injuries. As shown in Table II, the distribution of machines is that for 190 machine shops containing 6500 machines. These figures were compared with the 1921 totals for all the 395 machine shops in Pennsylvania, and all the machines in those shops, and found to be in about the same proportion.

Commenting on Mr. Fuller's paper, L. E. DeBlois, secretary National Bureau of Casualty and Surety Underwriters, 120 West Forty-second Street, New York, stated that the rate of return on an investment in safety devices is likely to run between 50 and 75 per cent—a far higher rate than the machine tool man can obtain in his own business.

No General Code Desired

Other speakers pointed out that the machine tool industry does not want a general safety code. It should be sufficient to select intrinsically hazardous machines and make codes for those. At the same time it is believed that engineers and others in the industry ought to anticipate "lopsided" codes made by State regulatory bodies, by preparing their own and getting them into use wherever particular hazards require it.

Mr. Doan said that the National Metal Trades Association has a well defined safety or accident prevention bureau which will cooperate with its members and others in a study of safety requirements, either by sending a man, by providing a code or by pictures. Examination of the records of a member company is made and the company is told how to save accidents and how to save on the cost of insurance. Mr. DuBrul suggested that the safety problem is more a problem of the users of the machines made by the National Machine Tool Builders' Association, rather than of the makers of these tools.

German Machine Tool Competition

ONE member told of a recent visit to the Leipzig Fair in Germany, and of what he saw in the Deutsche Museum in Munich, where working models are on exhibition of Watt's original engine, the "Puffing Billy" and many other historic engineering features. He advocated a good American museum of machine tools and requested members present to be on the lookout for old designs, particularly those in the infancy of each type of machine now in common use.

This speaker reported that on a visit to Germany in 1900 there was not much in the machine tool industry there to cause worry. In 1913 he saw equipment which was much better and a much closer approach to our own. What he found in 1927 "would put your eye out." The principal exhibit is in a building erected about five years ago and owned by the German Machine Tool Builders' Association. This building measures 82 x 175 m. (270 x 560 ft.). It has three bays with crane runways and two side bays for lighter material. It is one of the newest buildings in the layout, but is becoming inadequate and additions are to be made. The Leipzig Fair has been a regular function for the last 1200 years.

Special Built-In Features

Much cooperation was discovered between the machine tool builders and the motor builders. In many cases there was end connection between motor and machine, with control built into the machines as a connected unit. There was a continuous reading wattmeter with many machines, built in flush with the housing. Speed indicators showing spindle speeds are built in on some machines.

Some of the machines had spirit levels installed in place of graduated dials for diagonal setting. These levels, at 30, 45, 60 and 90 deg., furnish a much easier means of setting the machine quickly and accurately.

Many United States types of machines were on exhibition. Nothing distinctively new in design was there. Some screw machines copied from those of Brown & Sharpe and others were shown. The German Machine Tool Builders' Association includes 240 members, who had last fall 125,000 employees, which was stated to be about half the number required under really active conditions. These members, however, include those making wood-working machinery, punches and shears, small tools and accessories—groups not within the American Machine Tool Builders' Association.

Question was raised whether the United States could not establish some business in Germany on special machines. This could not be done on regular machines, for our cost is far higher—to the extent of 50 to 100 per cent.

Low Wages in Germany

Wages in the German machine shops were reported at about 15 to 25c. per hr. This may be com-

Table I—Analysis of Serious Injuries from Machine Shop Accidents

	Number of Cases				Indemnity Cost	
	Total		Point of Operation			
Cause	Fatal	Non-fatal	Fatal	Non-fatal	Total	Average
Abrasive Wheels	10	58	8	53	$155,667	$2,289
Punch Presses	2	97	1	93	162,898	1,645
Lathes	4	46	4	42	97,406	1,948
Milling Machines	..	15	..	14	24,959	1,664
Drills	1	24	1	22	51,389	2,056
Cold Rolls	1	7	..	3	14,683	1,835
Boring Mills	1	6	1	4	13,671	1,953
Plate Punches	..	2	..	2	1,676	838
Planers and Shapers	3	33	2	27	80,445	2,235
Drop Hammers	1	19	1	19	50,148	2,507
Miscellaneous	5	70	..	39	156,314	2,084
Woodworking Machines	3	56	3	56	103,389	1,753
Total	31	433	21	374	$912,646	$1,967
Total of all cases, mechanical and non-mechanical.	1,199				2,487,793	2,075

Table II—Relative Hazards of Machine Tools at Point of Operation

Machine	Cost of Serious Machine Injuries (a)	Distribution of Machines (b)	Hazard Index (c)	
Abrasive Wheels	14.3	10.2	2.9	
Punch Presses	15.9	1.7	19.3	
Lathes	10.0	21.1	1.0	(base)
Milling Machines	2.4	6.3	0.8	
Drill Presses	4.7	13.4	0.7	
Cold Rolls	0.4	0.5	...	
Boring Mills	1.3	1.6	1.8	
Plate Punches	0.2	0.2	...	
Planers and Shapers	6.5	9.5	1.4	
Drop Hammers	5.5	0.3	35.6	

(a) Percentage of "point of operation" serious injury cost to total machine indemnity cost, in Table I.

(b) Percentage distribution of 6500 machines in 190 shops.

(c) Ratio of (a) to (b), based on lathes at 1.0. Thus for lathes, hazard is $\frac{21.1}{10.0} \times \frac{14.3}{10.2} = 2.9$.

pared with English wages, which run about 30c. per hr., being 57s. on a 47-hr. week. These figures in England may be much increased by a bonus, which sometimes reaches 60 per cent, running the hourly rate up to 48c. In Switzerland the wages are about as in England.

Decided cooperation exists in Germany among industry, education and banking. The bankers are lending support to a degree not experienced in this country, while the disposition of the educational institutions is all toward helping the various industries solve their problems.

The speaker saw some special high-speed steel in operation. In particular, he saw some cut-off saws severing a 6-in. bar in 40 sec. The chips showed the bar to be composed of hard steel.

German Copies of American Machine Tools

Mr. DuBrul read a letter from United States Trade Commissioner Pilger, Berlin, relating to Germany copying of American machines. A protest had been sent to Professor Schlessinger, an active member of the Verein Deutsche Maschinenzeug Fabrik, regarding the German copying of American machines and the misleading advertising in which the American names were used, as if the machines were produced in the American plants. Following this protest the Verein solemnly passed a resolution condemning the practice of advertising the machines by the American names, but withholding comment from the practice of directly copying American machines. Mr. Pilger's letter showed that American interests in Germany are keenly alive to this situation and that information is constantly being transmitted to the Department of Commerce, Washington, regarding the practices in vogue in Germany.

It appears to be the general method to obtain as early and complete information as possible regarding innovations in American machines. This information then is published promptly in German papers, thus forestalling any effort on the part of the American manufacturer to obtain a patent in Germany—the bar of "prior publication" being alleged. This takes away all opportunity of American manufacturers to obtain the protection to which they are entitled.

American Names Paraphrased

It has become customary for the Germans to produce machines after American patterns and to label them System Gleason, System Bickford, System Gisholt, etc. When the German courts have been appealed to to stop this practice, they have proved very fair. Some of the speakers stated that this system of advertising German production by American names constitutes the main strength of the competition which the Americans have to meet. Many such machines which have been installed in various places have been later thrown out as inferior products.

"Petty patents" may be obtained in Germany, good for six years, which involve less in the way of formality than a regular patent. They are inexpensive and run from the date of application. The period is long enough for most requirements, because of the constantly improving characteristics of design, attachments, etc., in American machines. By the time the period expires, new practices undoubtedly would have developed here.

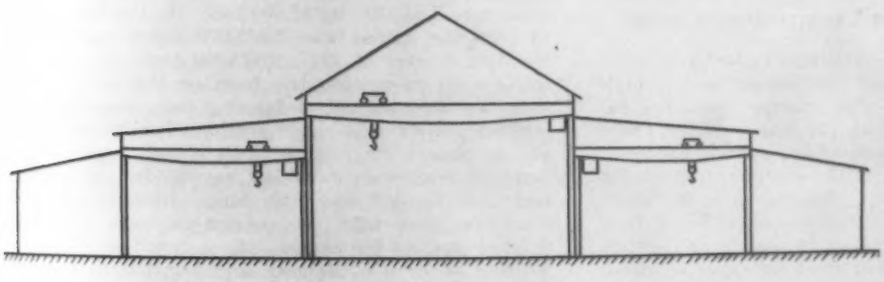
German grinding machine manufacturers are very active. They are nearer up to date, so far as American designs are concerned, than is the case with some of the others. They copy all our latest attachments and "stunts" for increasing production, but seem to have an uncanny facility for dodging those devices upon which we have patent protection.

Plans for Exposition

ALL available space in the exhibition hall has been taken up by members of the association. J. W. Carrel, chairman of the exposition committee, reported that many outside concerns which have applied for space will be accommodated in an abandoned street (covered with a tarpaulin canopy) alongside the main building. All the space in this street, which is 40 ft. wide, has already been sold.

Of the 121 members of the association, 110 will exhibit. This is 62 per cent of the total of 177 firms which will exhibit. Of the 65,000 sq. ft. of area available, the member firms have reserved 45,800 sq. ft., or 70 per cent. Machine tool exhibits, numbering 131 in all, will occupy 54,000 sq. ft., or 83 per cent of the total area. There are to be 46 exhibits of accessories, business papers and dealers' associations. About 250 carloads of material will have to go into the spaces and be located, wired and piped, if necessary, within a period of six days.

Following Mr. Carrel's statement, Mr. Everitt, manager of the exposition, told of some of the problems which will have to be met in getting the exhibits into place in the short time available. It was made clear that shipments must be sent early enough to be sure to get there in time. Arrangements have been made to avoid demurrage charges on early shipments. There are 16 entrances to the hall, two of which are 18 ft. wide and the others 7 ft. wide. All the large tools will be located near the aisles served by the 18-ft. entrances. Thus there should be a minimum of confusion in getting exhibits into the hall.



Section of Munich Industrial Museum Building, Showing Crane Facilities. The outside bays are for light equipment, not requiring crane service

Special Features

Thursday afternoon the machine tool builders joined a large delegation of engineers in an inspection of the buildings at West Point. For their benefit the authorities of the academy staged a regimental parade, with massing of the colors and passing in review, preceded by company drills. The organ recital in the new chapel at the Point was a feature.

At the jubilee anniversary dinner Tuesday evening Ralph E. Flanders, manager Jones & Lamson Machine Co., Springville, Vt., performed the office of toastmaster in a particularly felicitous manner. Digging into the past history of the association, he compared his activity to the science of geology, bringing up one "fossil" after another, as he designated those asked to speak. Each speaker represented a definite age in the history of the association, the successive ages going farther and farther back toward the beginning as the evening progressed. Finally J. W. Carrel gave a series of reminiscences of William Lodge, one of the founders of the association. The menu for the dinner follows:

Positive Feed Demonstration

Starting devices	Coolant
Tempering compound	Filler
Scaled accessories	Stampings
Spring ram with ball bearings	Anti-rust compound
Chips and cuttings with lubricant	Straight and taper pins

[Lack of space has made it necessary to defer until next week the discussion of the remaining features of this meeting.]

Continental Prices Still Depressed

Complaint of Unprofitable Export Is General—British Ferromanganese Forced Down by Norwegian Prices—German Industry Prosperous

(*By Cable*)

LONDON, ENGLAND, May 16.

THERE is a slight improvement in the domestic pig iron market, but export business is still stagnant. Hematite is weaker and the lower prices are beginning to develop more demand, especially for export.

On April 30, there were 189 furnaces in blast. Foreign ore continues dull. Ferromanganese prices have been reduced, as a result of the competition from American-owned Norwegian furnaces. Export prices are also easier and demand has been stimulated, resulting in increased sales.

Finished steel is quiet from the standpoint of new business, but makers are heavily engaged on old contracts, particularly for shipbuilding material. Prices are still fairly steady, but makers are more disposed to consider offers of buyers.

April exports of pig iron totaled 15,212 tons, of which the United States took 44 tons. The total exports of iron and steel in April was 334,534 tons.

Welsh tin plate bars have been reduced 5s. ($1.21) per ton to £6 5s. ($30.31) per ton, delivered, but demand has not yet been stimulated. Tin plate is very quiet, consumers purchasing only small parcels and awaiting lower prices. Makers using foreign sheet bars are quoting 19s. per base box, ($4.60) f.o.b., on forward delivery. Some mills are closing owing to lack of orders.

Galvanized sheets are moderately active in small lots following the recent heavy buying movement. There is some demand for heavy gage black sheets from Japan, but the thin specifications are still inactive.

Continental markets are quiet and prices continually receding. Consumers are not particularly interested in buying until values are more stable. The pig iron entente has discontinued price fixing.

FRENCH BUSINESS SMALL

Export Prices Unprofitable but Foreign Competition a Factor—New Construction Limited

PARIS, FRANCE, May 5.—Business is far from satisfactory, although everything that should tend to build confidence is in evidence. For example, exchange has been practically stabilized at 124 francs to the pound sterling, but both buyers and sellers apparently would prefer a legal stabilization of the exchange, despite the dangers that might ensue. Building construction is limited, except in the Paris area and along the Riviera and the farmers are not buying as heavily as they did last year. Prices of iron and steel for export continue weak, partly as a result of the small volume of business and partly because of the keen competition of other steel producing countries. Export sellers are at present facing a difficult situation. An advance in prices is impossible in view of the competition of other countries and costs are higher, with no possibility of reducing wages, as the cost of living is increasing.

Pig Iron.—A few more furnaces were blown in during March, but on April 1, there were 11 less furnaces in blast than on Jan. 1. Despite this decline, the production for the first quarter of the year exceeded the same period of 1926 by 85,000 tons. In the first quarter of 1926 the output was 2,240,000 metric tons and in the first quarter of 1927, 2,325,000 tons. Most of this increase in production has been on the side of basic iron, the total output of foundry iron, compared with last year, showing a slight decline. The domestic market on phosphoric foundry iron is less active and in domestic transactions as low as 500 fr. ($19.60) per ton, f.o.b. furnace has been done. Even this price is considered too high by consumers, who sell their finished product for export. As a result of the recent meeting of French, Belgian and Luxemburg pig iron producers, it was decided to establish export foundry iron prices as follows: For Britain and overseas countries, £3 7s. 6d. ($16.37) per ton, f.o.b. Antwerp; for Holland, £3 10s. 6d. ($17.09), free to frontier; for Switzerland, 92 Swiss francs ($9.69), f.o.b. Basle, exduty. No agreement was reached on the question of quotas for export. Although hematite pig iron prices

British and Continental European prices per gross ton, except where otherwise stated, f.o.b. makers' works, with American equivalent figured at $4.85 per £ as follows:

Durham coke, del'd.	£1	2½s.	to £1	3s.	$5.46	to $5.58
Bilbao Rubio ore†	1	2	to 1	2½	5.33	to 5.45
Cleveland No. 1 fdy.	3	17½			18.79*	
Cleveland No. 3 fdy.	3	15			18.18*	
Cleveland No. 4 fdy.	3	14			17.94*	
Cleveland No. 4 forge	3	13½			17.82*	
Cleveland basic	3	15	to 3	15½	18.18	to 18.30
East Coast mixed	4	1			19.64	
East Coast hematite	4	1½			19.76	
Rails, 60 lb. and up.	7	15	to 8	5	37.58	to 40.01
Billets	7	5	to 7	10	35.16	to 36.37
Ferromanganese	13	0			63.05	
Ferromanganese (export)	12	10			60.62	
Sheet and tin plate bars, Welsh	6	5			30.31	
Tin plate, base box	0	19¼	to 0	19½	4.66	to 4.72
Black sheets, Japanese specifications.	14	5			69.11	
					C. per Lb.	
Ship plates	7	10	to 8	0	1.62	to 1.73
Boiler plates	11	0	to 11	10	2.38	to 2.49
Tees	8	7½	to 8	17½	1.81	to 1.92
Channels	7	12½	to 8	2½	1.65	to 1.76
Beams	7	7½	to 7	17½	1.50	to 1.70
Round bars, ¾ to 3 in.	8	0	to 8	10	1.73	to 1.84
Steel hoops	10	10	to 11	0	2.28	to 2.39
Black sheets, 24 gage	11	5			2.44	
Galv. sheets, 24 gage	14	15			3.19	
Cold rolled steel strip, 20 gage, nom.	14	0			3.03	

*Export price, 6d. (12c.) per ton higher.
†Ex-ship, Tees, nominal.

Continental Prices, All F.O.B. Channel Ports

(Per Metric Ton)

Foundry pig iron: (a)					
Belgium	£3	2s.		$15.03	
France	3	2		15.03	
Luxemburg	3	2		15.03	
Basic pig iron:					
Belgium	3	2		15.03	
France	3	2		15.03	
Luxemburg	3	2		15.03	
Coke	0	18		4.37	
Billets:					
Belgium	4	6		20.85	
France	4	6		20.85	
Merchant bars:				C. per Lb.	
Belgium	4	12		1.01	
Luxemburg	4	12		1.01	
France	4	12		1.01	
Joists (beams):					
Belgium	4	14		1.02	
Luxemburg	4	14		1.02	
France	4	14		1.02	
Angles:					
Belgium	4	14		1.02	
⅛-in. plates:					
Belgium (nominal)	6	5		1.37	
Germany (nominal)	6	5		1.37	
½-in. ship plates:					
Belgium	5	17		1.28	
Luxemburg	5	17		1.28	
Sheets, heavy:					
Belgium	6	3	to £6 4s.	1.35	to 1.36
Germany	6	3	to 6 4	1.35	to 1.36

(a) Nominal.

are still being officially maintained, producers apparently offer concessions whenever desirable tonnage is in view. British offers are appearing irregularly.

Semi-Finished Material.—Domestic prices of billets, blooms and slabs are irregular, depending upon the tonnage involved in a transaction. In export trade, French and Luxemburg prices are generally lower than quotations of Belgian mills. Sellers, as a rule, are not interested in contracting for long term deliveries. The current quotations on blooms range from £4 to £4 5s. ($19.40 to $20.61) per ton and on billets from £4 6s. to £4 8s. ($20.85 to $21.34) per ton, f.o.b. Antwerp.

Finished Material.—With but little construction work in progress, demand is light, so that in many instances the domestic and export prices show but little difference. Low prices occasionally develop a few orders from merchants, but the tonnage going into consumption is small. Export prices are unsettled and vary with each transaction. Beams range from £4 12s. to £4 15s. per ton, (1.01c. to 1.04c. per lb.) f.o.b. Antwerp. The agreement to maintain sheet prices does not seem to be holding and concessions are in evidence. On sheets 5 mm. and heavier, export prices have declined to £5 17s. 6d. to £5 18s. per ton, (1.29c. to 1.31c. per lb.) f.o.b. Antwerp. The ingot production in March totaled 691,411 metric tons compared with 616,832 tons in February.

BELGIAN PRICES DEPRESSED

Foreign Competition Severe—Many Mills Need Tonnage to Maintain Operation

ANTWERP, BELGIUM, April 29.—With buyers exerting pressure for lower prices and business as a whole still confined to small tonnages, the tendency of the market is downward. A few mills are endeavoring to maintain their original quotations, but a large number are in need of tonnage to maintain operations and the result has been considerable irregularity of prices. Meanwhile, competition from other European countries is severe, so that prospects of an early recovery of the market seem remote. So serious is the situation considered in some quarters, that it is predicted that unless higher prices can be obtained, some mills will be forced to curtail production and a few may even suspend operation. Under such conditions it is extremely difficult to establish the current market price of various products as each sale depends upon the position of the mill and the requirements of the purchaser.

Pig Iron.—Quotations of the syndicate are unchanged in the domestic market, but actual sales at lower than the official schedule are reported. Phosphoric foundry iron of 2.50 to 3.00 per cent silicon is offered for export as low as £3 5s. to £3 6s. 6d. per ton, ($15.76 to $16.00) f.o.b. Antwerp. Half washed furnace coke is selling at 44 Belgian francs ($6.11).

Semi-Finished Material.—The attitude of mills depends almost entirely upon the state of their order books. A few, fairly well booked, are maintaining prices, while others in serious need of tonnage are offering concessions. In one respect all producers of semi-finished seem to be in agreement; the question of deliveries. In view of the expected formation of an international syndicate to control semi-finished products, none of the mills is disposed to contract for delivery over a long period. The current quotations on blooms are about £4 2s. 6d. ($20.20) per ton for 6 in. to 9 in. and £4 4s. 6d. ($20.70) per ton for 4 in. Billets range from £4 7s. 6d. ($21.45) per ton for 3 in. to 4 in. to £4 9s. ($21.80) per ton for 2 in. to 2½ in., all f.o.b. Antwerp.

Finished Material.—Both France and Germany are keen competitors for tonnage and prices continue low. For export, steel bars are quoted at £4 13s. 6d. to £4 14s. per ton (1.03c. to 1.05c. per lb.) and even these low quotations are apparently too high to satisfy foreign buyers, who are receiving still lower prices from France, Germany and Luxemburg. As low as £4 13s. per ton (1.02c. per lb.) is reported to have been done by Luxemburg sellers. The price of beams is unsteady and the tendency downward. Normal specifications are quoted at £4 13s. to £4 14s. per ton (1.02c. to 1.05c. per lb.), the price ranging up to £4 17s. per ton (1.07c. per lb.) for the less common profiles. There is practically no business in hoops and determination of the current price is difficult. About £6 2s. 5d. per ton (1.35c. per lb.) probably is a fair estimate of the current market. Corrugated bars are quotable at about £5 2s. 6d. per ton (1.13c. per lb.).

GERMAN MILLS WELL BOOKED

Prices Unchanged—European Electric Projects Bring Business to Equipment Makers

BERLIN, GERMANY, May 2.—The domestic market for iron and steel is active and prices are unchanged for May. Export, however, is dull and producers show but little inclination to secure foreign business. A large percentage of producers are so well booked that they are not interested in further domestic tonnage. Thus far the steel syndicate has not made the advance in prices that producers are asking, opposition from consumers being strong.

As export prices, f.o.b. Antwerp, have continued practically unchanged, the steel syndicate has not altered its bounties to exporting manufacturers. Domestic quotations continue at 100 m. ($23.68) per ton for ingots, 105 m. ($24.86) for blooms, 112.50 m. ($26.64) for slabs, 131 m. ($31.02) for shapes, 134 m. ($31.73) for bars, 154 m. ($36.47) for bands. In small finished products there is a tendency to advance prices, taking advantage of the general improvement of business. The screw association of Dusseldorf has increased prices from 8 to 15 per cent.

There is a shortage of semi-finished material. Demand for foundry iron has shown a considerable increase since the first of the year. Shipyards are active, demanding large tonnages of steel, and the spring building activity includes both residential and industrial construction. Although domestic purchasing of heavy rails is smaller and the railroad corporation has threatened to reduce its schedule of purchases, export continues satisfactory. Municipalities and private corporations operating street car lines have reduced their purchases of rails and the demand for mine rails is smaller, as a result of the closing of many coal mines, part of the policy of more efficient operation.

Of the steel consuming industries, the electrical equipment manufacturers are about the most active. To a great extent this industry is independent of increases and decreases in domestic demand, being assured of sufficient business from the rapidly proceeding electrification of transportation and industry both in Germany and in other central European and eastern European countries. A German report prepared for the Geneva Economic Conference shows 190,000 workers in this industry in 1925, compared with 140,000 in 1913. Based on value, Germany's production of electrical equipment is stated by the report to be 23.3 per cent of the world output, compared with 34.9 per cent in 1913. The production of the United States is placed at 48.1 per cent, compared with 28.9 per cent in 1913. The German share of world trade in electrical equipment has declined from 47.8 per cent in 1913 to 25.7 per cent in 1925, the United States now occupying first place.

The Gelsenkirchen Bergwerks has finally been merged with the Deutsch-Luxemburg and Bochum Cast Steel Co., and the new company, to be known as the Gelsenkirchen Bergwerks A. G., with a capital of 250,000,000 m., becomes a subsidiary of the United Steel Works. Iron, steel and coal companies throughout Germany are showing larger profits and many are declaring dividends after long intervals. On the stock market, steel company stocks are advancing, even the stocks of companies which have paid no dividend for some time. Stock of the General Electricity Co. has advanced in the past six weeks from 160 to 275. The stock of the Siemens & Halske Co., which was at about 60 early last year and 206 early this year, has reached 335. Stock of the United Steel Works has advanced from 140 to 160.

Class I railroads on April 30 had 259,736 surplus freight cars in good repair and immediately available for service, according to the car service division of the American Railway Association. This was a decrease of 10,197 cars compared with April 23, at which time there were 269,933 cars.

EXPORT BUSINESS DULL

Japan Buys Tin Plate, I-Beams and Tie Plates —British Mills Get Sheets

NEW YORK, May 17.—Trade with Japan has continued small, but with the moratorium ended, a resumption of purchasing is generally expected. Business with China is still confined to limited purchasing by merchants in Shanghai and Hong Kong. Among recent purchases by Japanese companies is 1500 boxes of tin plate for a sugar company in Formosa, placed with an American exporter. About 555 tons of I-beams for the Imperial Government Railways was awarded to a large Japanese exporter and placed with an American mill. About 630 tons of tie plates for the same railroad have been placed with the same exporter and divided between two large American makers. The inquiry of the Toho Gas Co. for gas pipe, which was postponed because of the moratorium, is expected to be renewed shortly.

Inquiries for tin plate continue to appear from Japanese merchants and consumers, but British mills are booking most of the current sheet business. The leading interest in the United States is understood to be maintaining its present price on exports of light gage black sheets to Japan to enable merchants with stocks on hand to reduce their holdings without the loss that a sudden reduction of the price would be likely to cause.

Refuses Use of Imported Shapes

Importers of European steel in the United States continue active and although recent purchasing has been almost entirely confined to small tonnages and the greater part of this business has been done on terms, the total sales in the past month or more have been large. Prices quoted by Continental mills are still low and better than 1.70c. per lb., base, could apparently be done by buyers of desirable tonnages.

In addition to the East New York Iron Works in Brooklyn, Gaynor & Rosenblum, another fabricating company of the borough, have encountered difficulty in the use of imported structural steel in a building. As a result of the recent action of the inspector of buildings in Brooklyn, in condemning the use of imported material in certain buildings, a number of steel importers in New York held a meeting last week and appointed a committee to discuss the matter with the Brooklyn authorities and endeavor to take steps to meet their requirements.

Quotas an Obstacle in Semi-Finished Cartel

PARIS, FRANCE, May 5.—The meeting of the board of directors of the International Steel Cartel, held in Luxemburg, May 3, was without result. Another meeting will be held in June, at which the question of forming syndicates to control sales and production of semi-finished material and beams, will be further discussed.

It is reported that the French representatives suggested that, as in the case of the International cartel, there should be no distinction between domestic and export business, in determining the quotas for these products and this was agreed to by the other directors.

Difficulty arose, however, when an effort was made to agree upon a period to be taken as a basis for the calculation of quotas in the proposed syndicates. The first quarter of 1927 was suggested as a basis, but during this period, French production was only 2,005,000 tons of steel ingots, compared with 2,016,000 tons in the same period of last year, but despite this French exports showed an increase of 279,862 tons and imports of steel declined by 2,363 tons.

An effort to use the last two quarters of 1926 was unsatisfactory and suggestion that the 12 months of last year be used as a basis was opposed by Belgium on the grounds that the first quarter of last year was particularly poor for Belgian mills, as it followed the long strike in the Charleroi district.

As discussions are to be continued at the meeting next month, in many quarters there is still belief that an agreement will eventually be reached.

BRITISH TRADE DECLINES

Exports and Imports of Iron and Steel Both Down in April

WASHINGTON, May 16.—Imports of iron and steel into Great Britain in April declined to 404,710 gross tons, or 15.3 per cent less than those of March, while exports declined to 334,534 tons, less than in March by 18,508 tons or 5.25 per cent, according to a dispatch to the Iron and Steel Division, Department of Commerce, from Commercial Attaché Charles E. Lyon, London.

The marked decline in imports in April is held to point toward recovery of the British iron and steel industry from the coal strike. With the exception of the group containing miscellaneous wire manufactures, all of the classifications of imports showed tonnages below those for March. Although the exports declined, they still remained comparable with normal conditions.

Production of steel during April also declined by nearly 100,000 tons, while the output of pig iron gained by slightly more than 8000 tons. Ingot and steel castings production was 850,100 tons, while the pig iron output was 680,000 tons. Eleven blast furnaces were lighted in April, bringing the total to 189, while the number of open-hearth furnaces in operation declined from 351 to 332, the smallest number reported operating at the end of any month in 1927.

German Export Credit Insurance Claimed Unsatisfactory

HAMBURG, GERMANY, April 25.—The export credit insurance, established in February, 1926, by the German Government, has apparently not been effective in extending export business and is generally looked upon as highly unsatisfactory. The principal reason for this dissatisfaction is that German and British bankers, in financing export orders, do not consider this Government insurance as security for advancing money on foreign drafts. This attitude of the bankers is based on the fact that although the insurance covers risk of non-payment, an indemnity is provided only when the customer pleads bankruptcy or absolutely refuses to pay.

According to statistics of the banks about 70 per cent of the non-payments on export shipments are occasioned by disputes over late delivery, shipment not according to contract, claims for faulty packing and similar complaints. In these cases, the holder of Government credit insurance cannot collect. The banks claim that the experienced exporters know their customers and do not, as a rule, take much risk.

According to reports, France, Belgium and Austria are at present contemplating various methods of Government export credit insurance.

French Exports of Pig Iron and Steel in March

PARIS, FRANCE, May 5.—Exports of iron and steel in March were distributed as follows: Pig iron, 65,906 tons; rolled material, including semi-finished, 217,340 metric tons, of which 3706 tons went to the United States; rails, 30,794 tons, of which 40 tons went to the United States. Exports in the first quarter of this year were 217,562 metric tons of pig iron, 752,136 tons of rolled material, of which the United States took 8000 tons, and 91,161 tons of rails, of which the United States took 443 tons.

Duty Applicable on Sheet Piling

WASHINGTON, May 17.—The United States Court of Customs Appeals in a decision recently announced affirmed the opinion of the United States Customs Court in upholding a protest of an importer that steel sheet piling is dutiable at 1/5c. per lb., and that accompanying fabricated steel corner pieces are assessable at 20 per cent as structural shapes of steel. The piling had been assessed as steel not specially provided for, at the appropriate rate according to value, while the corner pieces and ramming heads were assessed at 40 per cent as manufactures of steel.

Machinery Markets and News of the Works

BUSINESS IS SLOWER

Baltimore & Ohio Purchases the Principal Activity of the Week

Conditions Are Spotty but Volume of Buying Is Generally Lower Than Last Month

ALTHOUGH conditions in the machine tool industry are somewhat spotty, it is likely that sales in May will show a falling off as compared with those of last month. Users of tools are buying only the machines they must have for replacement purposes.

The principal activity of the past week was the placing of orders by the Baltimore & Ohio Railroad against a recent list. Additional orders will be placed this week, making the total number of machines bought about 25 or 30. It is expected in Chicago that orders will be placed soon by the Santa Fe for a list of tools it inquired for weeks ago.

The National Pneumatic Co., Rahway, N. J., purchased seven turret lathes, but other business of the week was mostly in single machines. A little business is being placed by automobile parts makers, but the automobile companies themselves are doing very little buying. The International Harvester Co., Chicago, is in the market for a few miscellaneous tools.

New York

NEW YORK, May 17.

THE Baltimore & Ohio Railroad will complete purchases this week against an inquiry sent out several weeks ago. Its total purchases will number 25 or 30 machines. The National Pneumatic Co., Rahway, N. J., bought seven turret lathes; other buying of the past week consisted mostly of single machines. Business is generally described as "slow." The following are included in the week's orders: Foundry company in Chicago, 400-ton wheel press; Texas & Pacific Railroad, 100-ton bushing press; a Hamilton, Ohio, safe manufacturer, a 53-in. boring and turning mill; an oil company in San Francisco, a 16-in. lathe; an Oakland, Cal., company, an 18-in. lathe; a Berkeley, Cal., company, a horizontal boring and drilling machine; a lubricating company in Detroit, a vertical surface grinder; a manufacturer of brake linings at Bridgeport, Conn., two multiple spindle drilling machines; an agricultural machinery company at Richmond, Ind., a vertical shaper; an oil company in Bayonne, N. J., a 16-in. lathe; an electrical manufacturer in Chicago, a jig borer; a motor company in Detroit, a deep-hole drilling machine.

The Board of Sewer Commissioners, Oyster Bay, N. Y., is asking bids until May 24 for pumping machinery and other equipment for a sewage pumping and treating plant. Sidney B. Bowne, Mineola, N. Y., is engineer. William O'Keefe is chairman.

The Federal Motor Truck Co., Van Alst Avenue, Long Island City, has leased property at Twenty-third Street and Thirteenth Avenue, New York, totaling 30,000 sq. ft. of space, for a main service and repair station.

The Radium Dial Co., 501 Fifth Avenue, New York, has leased a floor in the building at 114 East Thirty-second Street for a new factory, for which equipment will soon be installed.

The Reclamation & Building Corporation, 238 William Street, New York, has plans for a four-story addition to the automobile service, repair and garage building at 4-19 East 102nd Street, to cost about $165,000.

The Board of Education, South Huntington, N. Y., is said to be planning the installation of manual training equipment in its proposed three-story grade and junior high school, to cost $300,000, for which bids have been asked on a general contract. August H. Galow, Huntington, N. Y., is architect.

Fire, May 3, damaged a portion of the plant of the American Antique Brass Co., Inc., 54-58 East Ninth Street, with loss including equipment, patterns and stock.

S. J. Kessler, 529 Courtlandt Avenue, New York, architect, has plans for a three-story automobile service, repair and garage building, to cost close to $90,000 with equipment.

The Nevin Bus & Truck Mfg. Co., affiliated with the Nevin Bus System, 203 West Thirty-third Street, New York, is reported to be planning the construction of a new one-story plant at Jamaica, L. I., with one-story power house, to cost in excess of $100,000.

The Board of Education, Park Avenue and Fifty-ninth Street, New York, plans the installation of manual training equipment in a new three-story high school at Far Rockaway, N. Y., to cost $2,000,000, for which bids are being asked on a general contract until May 24. William H. Gompert, Flatbush Avenue Extension and Concord Street, Brooklyn, is architect.

The Gulf Refining Co., 21 State Street, New York, has filed plans for additions to its plant at Bayonne, N. J., to cost more than $150,000; the work to include a new oil heater extension, pumping stations and other structures, with equipment.

The Public Service Electric & Gas Co., Public Service Terminal, Newark, N. J., is completing plans for a new two-story service and equipment building at Jersey City, N. J., to cost upward of $40,000.

The Auto Strop Safety Razor Co., Virginia Avenue, Newark, N. J., will soon begin the erection of a one-story addition, 60 x 250 ft., for which bids on a general contract recently have been asked.

The Board of Education, Fort Lee, N. J., plans the installation of manual training equipment in a proposed two-story high school to cost $650,000. Ernest Sibley, Bluff Road, Palisade, N. J., is architect.

The Eastern New Jersey Power Co., Asbury Park, N. J., is arranging for a bond issue of $1,000,000, a portion of the proceeds to be used for extensions and improvements.

Joseph A. Hoegger, Inc., 351 Palisade Avenue, Jersey City, N. J., manufacturer of door fasteners and other hardware specialties, is completing plans for an addition to cost close to $50,000. Lockwood, Greene & Co., 100 East Forty-second Street, New York, are architects and engineers.

The Pneumatic Boat Corporation, Newark, has established a plant at 102 Murray Street for the manufacture of marine specialties.

Plate-Adams, Inc., 175 Montgomery Street, Jersey City, has been organized to carry on a general mill supply business, carrying in stock heavy hardware, tools and materials for factories, railroads, ships and contractors. The company is in the market for materials and equipment of this nature.

The New York office of the Pittsburgh Bridge & Iron Works, Pittsburgh, has been removed from 2 Rector Street to 150 Broadway.

The Dodge Mfg. Corporation, manufacturer of power transmitting and conveying equipment, has removed its offices from 53 Park Place to 200 Hudson Street, New York.

The Roller-Smith Co., 233 Broadway, New York, has appointed William H. Neville, Age-Herald Building, Birmingham, and the Atkinson Equipment Co., Atlanta, Ga., its representatives in Alabama and Georgia, respectively.

The Hoosick Iron Works, Inc., Hoosick Falls, N. Y., care of Frank J. Spath, 1605 Whitesboro Street, Utica, N. Y., recently formed by Mr. Spath and associates, is said to be planning the operation of a general steel and iron works at Hoosick Falls. M. William Bray, Utica, will be an official of the new company.

Philadelphia

PHILADELPHIA, May 16.

THE Gill Glass Co., Inc., Amber and Venango Streets, Philadelphia, will take bids at once for a two-story addition, to cost close to $200,000 with equipment. Irwin T. Catharine, Franklin Trust Building, is architect.

The Pennsylvania Railroad Co., C. E. Walsh, purchasing agent, room 415, 15 North Thirty-second Street, Philadelphia, is asking bids until May 27 for electrical and mechanical equipment and apparatus, repair parts, accessories and renewals therefor, contract 56-1927; also, for frogs, crossings and cross-overs, contract 54-1927.

Plans have been filed for a new four-story automobile service, repair and garage building, 70 x 240 ft., at 1515 North Broad Street, Philadelphia, estimated to cost about $350,000, to be occupied by Harper & Harper, 720 North Broad Street, automobiles.

The Department of Public Works, Bureau of Engineering, room 216, City Hall, Philadelphia, is asking bids until June 8 for mechanical and electrical equipment for the Northeast sewage pumping station. George H. Biles is director.

H. H. Kline, Bulletin Building, Philadelphia, architect, has filed plans for a two-story automobile service, repair and garage building, to cost clost to $100,000, with equipment.

The Huff-Deland Aircraft Corporation, Bristol, Pa., has taken an option on property known as the Pardee tract, Perth Amboy, N. J., totaling about 50 acres, for a proposed new manufacturing plant, comprising a complete operating unit for parts and assembling of machines both for land and water. The plant is reported to cost close to $150,000. Motors, as heretofore, will be purchased from outside sources, notably from the Wright Aeronautical Co., Paterson, N. J. The company is also reported to be considering plant sites at Buffalo and Detroit.

The Department of Supplies, room 312, City Hall, Philadelphia, E. J. Lafferty, director, is asking bids until May 25 for a portable gasoline engine-driven air compressor, class 211.

The Ballinger Co., Twelfth and Chestnut Streets, Philadelphia, architect and engineer, has completed plans for a one-story automobile service, repair and garage building, 125 x 170 ft., to cost close to $85,000 with equipment.

The Board of Education, Trenton, N. J., is considering the installation of manual training equipment in a proposed central senior high school on tract of 36 acres, recently purchased, to cost in excess of $2,000,000, for which plans will be drawn by Ernest Sibley, Bluff Road, Palisade, N. J., architect.

The Fidelity Auto Shop, 4316 North Broad Street, Philadelphia, has awarded a general contract to J. Y. Loux, Fifteenth Street and Hunting Park Avenue, for a new one-story works. Paul L. Boyd, 6943 Limekiln Pike, is architect.

The Lansdowne School Board, Lansdowne, Pa., is considering the installation of manual training equipment in a new two-story junior and senior high school to cost about $250,000. Heacock & Hokanson, 1211 Chestnut Street, Philadelphia, are architects.

The Birdsboro School District, Birdsboro, Pa., is considering the installation of manual training equipment in a new two-story high school to cost more than $200,000, for which bids will be asked this month. Ritcher & Eller, 147 North Fifth Street, Reading, Pa., are architects.

The Baldwin Locomotive Works, 500 North Broad Street, Philadelphia, has authorized the immediate construction of a new machine shop at its Eddystone Works. The present shop will be removed from the North Broad Street plant and additional facilities provided. The company has plans under way for a six- to eight-story administration building at the Eddystone plant for which it is purposed to ask bids soon on a general contract.

The Delaware & Hudson Railroad Co., Albany, N. Y., has plans for a new car repair yard and two-story shop and office building at Carbondale, Pa., to cost about $70,000 with equipment. James MacMartin, Albany, is company engineer.

The H & H Bolt & Nut Co., Inc., Schuylkill Haven, Pa., has been organized to manufacture bolts, nuts, spikes, rivets and pipe nipples. A plant for the manufacture of the latter product has been completed and the company will begin operation about June 1. Plans are being considered for a building to house the forging department.

The Box Crane & Hoist Corporation, Trenton Avenue, East Ontario and Tioga Streets, Philadelphia, has appointed the following representatives: Gray Foundry, Inc., Poultney, Vt.; F. R. Quigley, 1402 Lexington Building, Baltimore; Maintenance Engineering Co., 2000 Harrington Street, Houston, Tex.; Spencer & Morris, 430 East Third Street, Los Angeles; R. E. Condit, Dayton, Ohio; W. J. Laufenburg, Kansas City, Mo.; W. F. Moody & Co., Little Rock, Ark.; St. Louis Structural Steel Co., 1217 Syndicate Trust Building, St. Louis; McNeely Equipment Co., 707 Guaranty Building, Indianapolis, and J. F. Bruce, 1017 Engineers Building, Cleveland.

Chicago

CHICAGO, May 16.

THE machine tool trade is spotty, some dealers finding the first half of May the best first two weeks of any month so far this year while others report a falling off in sales. Inquiry is widely scattered and seldom calls for more than one or two machine tools.

The Santa Fe is asking for additional information on a number of proposals and it is the opinion that some of the tools on its list will be purchased soon. The Union Pacific has bought a lathe for delivery in the West and is at work on a small list. The Illinois Steel Co. is considering the purchase of four large lathes and the International Harvester Co. is again in the market for a few miscellaneous tools. Four presses have been purchased and a Chicago machine shop has placed a 6-ft. super-service radial drill.

John H. Glover, representative in the Chicago district for the Cone Automatic Machine Co., Windsor, Vt.; the Goss & DeLeeuw Machine Co., New Britain, Conn., and the W. Gaterman Mfg. Co., Manitowoc, Wis., has removed his offices to 2127 North Sayre Avenue, Chicago.

The Centripact Pulverizer Corporation, 1825 Blake Street, Denver, Colo., has been organized to manufacture pulverizing machinery, but at present is having its manufacturing done by contract. The company is in the market for materials comprising the pulverizer parts which are made of manganese steel, and is looking for a better metal of the required toughness and strength necessary for abrasion.

The Board of Trustees, Glencoe, Ill., Edward T. Wilder, city clerk, is asking bids until May 24 for equipment for a municipal waterworks. Alvord, Burdick & Howson, Hartford Building, Chicago, are engineers.

The City Council, Jacksonville, Ill., is said to be planning the installation of a municipal electric light and power plant to cost close to $100,000 with equipment. H. S. Caldwell, Ayres Bank Building, is engineer.

The Superior Coal Co., Gillespie, Ill., plans to rebuild its engine plant and coal washery destroyed by fire May 7.

The Atlantic Wire & Iron Works, 1638 Fulton Street, Chicago, will take bids early in June for a three-story addition, to cost about $65,000 with equipment. H. J. Pafelbach, 956 North Michigan Avenue, is architect.

The Maizwood Products Corporation, Chicago, care of Hugh Brennan, 209 South State Street, president, is considering plans for a new one-story mill at Dubuque, Iowa, 60 x 450 ft., for the manufacture of wallboard products under a special process, to cost close to $100,000 with equipment.

The Bureau of Reclamation, Denver, Colo., is asking bids until June 10 for five gate hoists and five gates for the Klamath project, Oregon-California.

The Western Feldspar Milling Co., 1151 South Ogden Street, Denver, Colo., has plans for a one-story grinding mill, 55 x 76 ft., for which superstructure will begin at once.

The Cooper Mfg. Co., South First Avenue, Marshalltown, Iowa, manufacturer of automobile parts, will proceed with erection by day labor of a one-story addition, 35 x 190 ft., to cost $150,000 with machinery.

The City Council, Dickinson, N. Dak., is arranging a fund of $75,000 for a municipal waterworks, to include the installation of deep-well pumping machinery and auxiliary equipment.

The Common Council, Woodward, Iowa, has authorized plans for extensions and improvements in the municipal electric light and power plant, including installation of additional equipment.

Huszagh & Hill, 6 North Michigan Avenue, Chicago, architects, have plans for a new six-story automobile service, repair and garage building, to cost about $350,000 with equipment. H. L. Clute, 307 North Michigan Avenue, is mechanical engineer.

The Kiowa Foundry Co., Chamber of Commerce Building, Marshalltown, Iowa, has awarded a general contract to the

The Crane Market

NEW inquiry for cranes is light, particularly in the locomotive crane field. In overhead equipment there is a list from the Austin Co., 120 Broadway, New York, which includes two 10-ton electric overhead cranes, one transfer crane and some monorail for installation at a new plant for the Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y. The Donner Steel Co., Buffalo, is asking for prices on a 5-ton, 30-ft. lift electric hoist for a jib crane. On May 13, the purchasing agent for the Government of Porto Rico, 17 Battery Place, New York, opened bids on a 7-ton, 28-ft. 6 in. span hand power crane for shipment to Porto Rico. Pending business in locomotive cranes still includes four cranes for the Baltimore & Ohio Railroad and several for the Amtorg Trading Co., 165 Broadway, New York.

Among recent purchases are:

A. B. See Elevator Co., Jersey City, N. J., a 5-ton, 25-ft. span electric traveling crane reported purchased from the Milwaukee Electric Crane & Mfg. Co.

T. R. Miller Mill Co., Brewton, Ala., a 15-ton, 8-wheel, steam-driven locomotive crane from the American Hoist & Derrick Co.

Lehigh Valley Railroad Co., 143 Liberty Street, New York, a 20-ton special type gantry crane from the McMyler Interstate Co.

Elgin, Joliet & Eastern Railway Co., Chicago, a 20-ton, 71-ft. span electric overhead crane from the Niles Crane Corporation.

C. F. Reimer Co., Marshalltown, for a one-story and basement foundry, 60 x 130 ft.

The Hanson Clock Co., 1120 Eleventh Street, Rockford, Ill., will soon begin the construction of a two-story addition, 50 x 140 ft., to cost close to $40,000, for which a general contract has been let to Linden & Sons, Inc., 1110 Tenth Street.

Ovens and power equipment, elevating and conveying machinery will be installed in the four-story and basement factory, with six-story tower, 165 x 250 ft., to be erected by the Cream of Wheat Co., Fifth Street and First Avenue, North, Minneapolis, Minn., to cost $1,000,000. Bids will be asked on a general contract before the close of the month. Walter H. Wheeler, Metropolitan Life Building, is architect and engineer.

The Caterpillar Tractor Co., West Washington Street, East Peoria, Ill., is considering plans for a one-story service, repair and garage building, to cost $140,000 with equipment.

The Eastern Minnesota Power Co., Milaca, Minn., will soon begin the construction of an addition to its steam-operated electric power plant, with installation of additional equipment, to cost upward of $50,000. R. B. Fanning, Kasota Building, Minneapolis, Minn., is consulting engineer.

The Chicago headquarters of the Austin Co. have been moved to 510 North Dearborn Street.

New England

BOSTON, May 16.

ALTHOUGH additional machine tool sales are reported, business the past week was less than that in the previous week, the most important transactions noted being a No. 4 power press and a Cincinnati all-steel brake, each to a Massachusetts shop. New inquiries also showed a falling off, but there is considerable old business pending aggregating several thousand dollars. The closing of these inquiries, however, is indefinite as some of the most important manufacturers contemplating tool purchases are holding back, but in many instances appropriations have been made. Many New England metal-working plants report a falling off in bookings, which accounts in part for the tendency to defer machine tool purchases. Few metal-working plants are operating full, the majority being on an 80 per cent basis or less.

The Worcester Consolidated Street Railway Co., Worcester, Mass., has started construction of a car barn for which motors are required. E. G. Buckland, vice-president, is in charge of the work. H. R. Whitney, 107 Main Street, Worcester, is the engineer.

The James Hill Mfg. Co., 20 Gordon Avenue, Providence, R. I., tin products, has started work on a one-story, 40 x 156 ft. addition. The Dwight Seabury Co., 12 East Avenue, Pawtucket, R. I., is the architect.

The Worcester Airport Corporation, 692 Southbridge Street, Worcester, is having plans prepared for an airport at North Grafton, Mass., to include a 30 x 35 ft. machine and repair shop. Matthew P. Whittall is chairman of the commission in charge.

Thomas Hixon, 4 Liberty Square, Boston, architect, has completed plans for a one and three-story, 140 x 180 ft. manufacturing and storage plant and garage at Worcester, Mass., for the Chelmsford Co. ginger ale, for which conveying equipment and motors are required. R. C. Goudey is manager of the Chelmsford Co.

H. H. West & Son, Manchester, Conn., operating a woodworking plant, have extensions and improvements under way to provide about 3000 sq. ft. additional space. New equipment will be installed.

The Eagle Knife & Bar Co., Lawrence, Mass., has acquired the local property of the Emerson Machine Co., destroyed by fire a few months ago, and is said to be planning to use for expansion.

A. H. Merriman & Sons, Inc., Waterbury, Conn., has plans under way for extensions in its cold storage and refrigerating plant, including the installation of additional equipment. C. Jerome Bailey, Waterbury, is architect.

The Erskine-Danforth Corporation, Stamford, Conn., manufacturer of furniture, has awarded a general contract to the J. W. Ferguson Co., Paterson, N. J., for a top story addition to the present factory, 60 x 132 ft., and one-story extension, 35 x 110 ft., to cost about $50,000 with equipment. Headquarters are at 383 Madison Avenue, New York.

The National Metal & Rubber Co., 27 Stillings Street, Boston, has plans for a one-story addition to cost close to $50,000 with equipment.

The Public Utilities Vermont Corporation is being organized by W. B. Foshay & Co., Minneapolis, Minn., operators of electric light and power properties, to take over the Clyde River Power Co., Island Pond, Vt., and plans expansion, including the development of hydroelectric power sites secured with the purchase and extensions in transmission systems.

The Lowell Paper Tube Corporation, Lowell, Mass., has acquired a local factory, forming part of the property of the Lawrence Mfg. Co., and will remove to the new location. Additional equipment will be installed.

Ovens, power equipment, conveying and other machinery will be installed in the new three-story plant to be erected by the Twentieth Century Baking Co., 32 Fleet Street, Haverhill, Mass., to cost close to $90,000. M. H. Maney, 46 Cornhill Street, Boston, is architect.

Buffalo

BUFFALO, May 16.

BIDS will be asked in June by the Niagara Machine & Tool Works, 637-83 Northland Avenue, Buffalo, for a one-story machine shop addition, to cost approximately $90,000 with equipment. H. E. Plumer & Associates, 775 Main Street, are architects and engineers.

The Eclipse Machine Co., Elmira, N. Y., is arranging for the establishment of a new plant at East Orange, N. J., for the manufacture of aircraft starting and automobile equipment. The initial works will be in a portion of the plant of the A. P. Smith Mfg. Co., 275 North Arlington Street, which will soon build a three-story extension. The Eclipse company is said to be planning to move to the new location.

The Buffalo General Electric Co., Electric Building, Buffalo, is planning the construction of two new power substations, each with ultimate capacity of 36,000 kw., and an addition to its present power station D. The entire project is reported to cost more than $350,000. Extensions will also be made in transmission lines.

The International Casement Co., Hopkins Avenue, Jamestown, N. Y., manufacturer of furniture, will take bids at once for a one-story addition, to cost close to $40,000 with equipment. Beck & Tinkham, Bailey Building, are architects. Frank G. Garrett is head.

The Pennsylvania Gas Co., Warren, Pa., operating at Jamestown, N. Y., and vicinity, has applied for permission to construct and operate an artificial gas plant at Lakewood, N. Y., for service at this place, Carroll and other points in Chautauqua County.

The Board of Education, Honeoye Falls, N. Y., is considering the installation of manual training equipment in

a new three-story high school to cost $200,000, for which plans will be prepared by A. W. and H. B. Dryer, 217 East Avenue, Rochester, N. Y., architects.

Shur-Heet, Inc., Gouverneur, N. Y., has been organized to manufacture oil burners and kindred equipment. The company plans to build a factory in the near future and is in the market for fittings, pipe, valves, drills, taps and castings.

Pittsburgh

PITTSBURGH, May 16.

MACHINE tool business is very slow in this district. Not only are fresh inquiries fewer, but many old ones which had been regarded as promising have lately become dormant. Heavy machinery trade also is sluggish.

Plans have been filed by the Acme Stamping & Mfg. Co., 201-7 Corliss Street, Pittsburgh, for a one-story addition to cost about $21,000 with equipment.

The General Motors Corporation, Detroit, has plans under way for a new one-story assembling plant on Liberty Avenue, Pittsburgh, to cost about $250,000 with equipment. Albert Kahn, Inc., Marquette Building, Detroit, is architect.

The Allis-Chalmers Co., Milwaukee, has concluded negotiations for the purchase of the plant and business of the Pittsburgh Transformer Co., Preble Avenue and Columbus Street, Pittsburgh, manufacturer of electric transformers. It will be operated as a branch and will continue in the same line of production.

The Huntington Sash, Door & Trim Co., Huntington, W. Va., has purchased a 2½-acre tract in the Westmoreland section, as a site for a new plant, with power house, to cost in excess of $115,000 with machinery. It is understood that the present mill will be removed to the new location.

The Alpha Sign Co., 231 Spahr Street, Pittsburgh, has leased space in the building at Penn and Highland Avenues for the establishment of a new plant.

The Pennzoil Refining Co., Oil City, Pa., refined oils and gasoline, has plans under way for additions to cost close to $300,000 with equipment. A new pumping station will also be built. The A. G. McKee Co., 2422 Euclid Avenue, Cleveland, is engineer.

The Board of Education, Johnsonburg, Pa., is considering the installation of manual training equipment in a new two-story high school to cost $150,000, for which bids will be asked on a general contract before the end of the month. R. G. Howard, Deposit National Bank Building, Du Bois, Pa., is architect.

The Pittsburgh Electric & Mfg. Co., 7301 Penn Avenue, Pittsburgh, has leased the two-story and basement building at 6526-28 Hamilton Avenue for a factory branch and distributing plant. Former property of the company at Point Breeze has been acquired by the Penn-Lexington Land Company.

Cincinnati

CINCINNATI, May 16.

WHILE some machine tool builders report increased sales the past week, total bookings in the first half of May were less than those in the fore part of April. Despite the slight improvement, there is no definite indication of an abandonment by machine tool users of the policy of buying only the equipment they need for replacement purposes. The liberal volume of inquiries now before the trade is a source of encouragement. The Mosler Safe Co., Hamilton, Ohio, has purchased a 53-in. heavy boring mill, and the Texas & Pacific Railroad has contracted for a 100-ton bushing press. The American Steel Foundries has placed an order for a 48-in., 400-ton wheel press.

The Upset Screw Mfg. Co., Cincinnati, recently organized, will operate works at 650 Evans Street.

The Arrow Sand & Gravel Co., 79 East State Street, Columbus, Ohio, has plans for the construction of a new storage and distributing plant at 555 Furnace Street, with steel tipple and other mechanical equipment, to cost $200,000.

The Volunteer Portland Cement Co., Holston Bank Building, Knoxville, Tenn., is completing plans for the construction of a new cement mill near the city, to cost more than $1,250,000 with machinery. Howell J. Davis is vice-president.

The Gardner & Harvey Co., 407 North Charles Street, Middletown, Ohio, manufacturer of paper products, has awarded a general contract to the F. K. Vaughn Co., Hamilton, Ohio, for a two-story addition to its mill, estimated to cost $40,000.

Reibel Sons & Matheny, First National Bank Building, Columbus, Ohio, architects, have plans under way for a two-story and basement automobile service, repair and garage building, 82 x 165 ft., at Lancaster, Ohio, to cost about $85,000 with equipment.

The Holston Quarry Co., Knoxville, Tenn., has inquiries out for drag-line bucket equipment, about 3-yd. capacity, Page type preferred.

Charles Primm, head of the Primm Lumber Co., 610 Mulberry Street, Nashville, Tenn., and associates are planning the construction of a new plant on the Murfreesboro Pike where site has been acquired, for the manufacture of store and office fixtures and kindred furniture, to cost more than $100,000 with machinery.

The Manganese Ore Co., Watauga Valley, Tenn., is planning for the installation of centrifugal pumping machinery and other equipment at its local properties.

The Austin Co., Cleveland, engineer and builder, has opened a branch office in the Dixie Terminal Building, Cincinnati, which brings the total of its offices throughout the country to 13. H. L. Cornelison, until recently manager of the Miami, Fla., office, has been placed in charge at Cincinnati.

South Atlantic States

BALTIMORE, May 16.

THE Anchor Post Fence Co., 9 East Thirty-eighth Street, New York, with plants at Garwood, N. J., and Cleveland, has awarded the general contract to the Austin Co., Cleveland, for the first unit of its new plant to be erected at Baltimore. The building will be of reinforced concrete, 200 x 500 ft., and will be equipped with an overhead traveling crane, weaving looms and a continuous galvanizing unit.

Bids are being asked by the Board of School Commissioners, Madison and Lafayette Streets, Baltimore, until May 25 for equipment for machine shops in the public schools. John H. Roche is secretary.

The Chesapeake Paper Board Co., Key Highway, Baltimore, is planning the construction of a one-story addition, 86 x 200 ft., to cost in excess of $100,000 with machinery. James E. Smith is president.

The Glass Decorating Corporation, Eastern Avenue and Thirty-seventh Street, Baltimore, has acquired the plant and business of the Pyrograph Advertising Sign Corporation, manufacturer of signs, and will use for expansion.

E. Canby May, duPont Building, Wilmington, Del., architect, will soon take bids on a general contract for a two-story automobile service, repair and garage building at Salisbury, Md., to cost close to $90,000 with equipment.

The City Council, Baltimore, is arranging a fund of about $1,500,000 for the establishment of a flying field for municipal aircraft and flying units of the State National Guard, including hangars, shops, etc. A tract of 1000 acres has been purchased.

The Covington Mills, Covington, Ga., have plans under way for the complete electrification of their textile plant, and will install motors, controls, etc. Robert & Co., Bona Allen Building, Atlanta, Ga., are engineers.

The United States Shipping Board Merchant Fleet Corporation, Washington, is asking bids until May 24 for furnishing such quantities of wire rope as may be required at Atlantic, Gulf and Pacific Coast ports for a period of 6 months, beginning June 1.

The South Carolina Ice & Cold Storage Co., Greensboro, N. C., care of Robert R. Livingston, 231 South Elm Street, recently organized by Mr. Livingston and associates, is said to have concluded negotiations for the purchase of two ice-manufacturing plants at Anderson, S. C. Other properties will be purchased in this section and expansion carried out, including the installation of improved machinery.

H. M. Byllesby & Co., 231 South La Salle Street, Chicago, operating electric light and power properties in different parts of the country, are at the head of a project to construct two hydroelectric generating plants on the Potomac River, vicinity of Washington. The Potomac River Corporation has been organized to carry out the development, which will consist of stations at Chain Bridge and at Great Falls, each with capacity of 155,000 hp. A steel tower transmission system will be built to furnish service at different points in Maryland, Virginia and West Virginia. The entire project will cost in excess of $45,000,000.

The Monumental Machine Co., 2505 Elliott Street, Baltimore, has awarded a general contract to Drummers & Davis, 121 South Highland Avenue, for a one-story addition to its machine shop, to cost approximately $20,000 with equipment.

The Pocomoke Fertilizer Co., Laurel, Del., has selected property at Pocomoke, Md., as a site for a new two-story plant, to cost $50,000 with equipment. E. S. Valliant is president.

J. W. Hoopes, Denbigh, Va., is planning the establishment of a one-story foundry and machine shop for the pro-

duction of brass and iron castings, finishing, etc., for which a site has been selected. Work will soon begin.

The East Carolina Railway, Tarboro, N. C., is planning the purchase of an elevated steel tank and tower, with capacity from 75,000 to 100,000 gal.

Cleveland

CLEVELAND, May 16.

THE machinery market continues to drag, with orders confined mostly to single machines. One line of turret lathes showed improvement during the week and a number of single orders were booked. While a little business is coming from automobile parts manufacturers, buying by the automotive industry is very light. No business is coming from the railroads in this territory. There is a fair demand for good used tools and wood-working machinery is moderately active.

The B. F. Goodrich Co., Akron, Ohio, will shortly begin the erection of a plant at Los Angeles to supply its trade in the Western territory. The company has acquired a 45-acre site, 15 acres of which will be occupied by the first unit.

The Canton Cutlery Co., Canton, Ohio, and Brown-McPherson & Co., Wallingford, Conn., have been merged into a $300,000 company, with combined plant in Canton, and will be known as the Car Van Steel Products Co. W. Stuart Carnes, head of the Canton company, will be president, and H. L. Zimmerman and O. A. Brown, of Wallingford, will be connected with the company in official capacities.

The American Register Co., 3608 Paine Avenue, Cleveland, manufacturer of registers for heating systems, has placed contract for the erection of a three-story, 43 x 47 ft., addition.

The Kulka Iron & Metal Co., Alliance, Ohio, has been organized to deal in structural shapes and plates and scrap iron and metal.

The C. J. Tagliabue Mfg. Co., Brooklyn, N. Y., maker of industrial instruments, has opened a branch factory at 5902 Carnegie Avenue, Cleveland, which will be devoted largely to repair work and emergency orders.

The Euclid Crane & Hoist Co., Chardon Road, Euclid, Ohio, is considering the construction of a one-story addition, to cost about $35,000 with equipment.

The Lake Erie Iron Co., B. F. Keith Building, Cleveland, has awarded a general contract to the J. L. Hunting Co., Guarantee Title Building, for a new one-story machine shop, 75 x 130 ft., to cost about $60,000 with equipment.

The Board of Education, Bellevue, Ohio, plans the installation of manual training equipment in a proposed two-story high school to cost $225,000, for which bids will be asked soon on a general contract. Millot Parker, Bliss Building, Sandusky, Ohio, is architect.

The Ohio Truck Body & Wagon Co., 3291 East Sixty-fifth Street, Cleveland, has filed plans for a new one-story plant, 70 x 150 ft., for the manufacture of bodies for motor trucks, etc., to cost close to $60,000 with machinery.

Milwaukee

MILWAUKEE, May 16.

BUILDERS of machine tools are receiving a moderate run of orders, mostly for single items and evidently for replacement purposes or small extensions of capacity. Sales of special tools probably exceed those of standard types. Automotive buying is of relatively small proportion, with prospects only fair for volume business. There has been scattering inquiry from railroads, but few transactions have been closed. Industrial buying continues conservative.

The Milwaukee Department of Public Works, City Hall, is asking sealed bids until June 2 for the complete construction and installation of three new 75-ton furnaces in the municipal garbage incinerating plant. A bond of $20,000 or check for $10,000 is required with each bid. Roland E. Stoelting is commissioner.

The Acme Pattern Works, 495 Fifty-sixth Avenue, West Allis, Milwaukee, has placed contracts for the construction of an addition, 80 x 160 ft., part two stories. It manufactures wood and metal patterns and other foundry specialties.

The Trane Co., Second and Cameron Streets, LaCrosse, Wis., is having plans prepared for a proposed new manufacturing building, 100 x 250 ft., and several smaller units, on a new site on West Avenue. Construction may not be undertaken until late in the fall, however. The company manufactures steam and vapor heating supplies, pumps, cabinets and other specialties.

The Mixermobile Corporation, 3236 Vliet Street, Milwaukee, manufacturer of portable concrete mixers, has broken ground for a one-story addition, 30 x 100 ft.

The Twin City Packing Co., 210 Belleview Street, Menominee, Mich., will invest $100,000 in a new packing plant, cold storage and auxiliary buildings on a new site on Ogden Avenue. Plans have been completed by Kamrath & Christensen, architects, 111 West Jackson Boulevard, Chicago, and bids will be taken after May 18. The main building will be two stories, 90 x 186 ft. Louis Kreuz is general manager.

The Board of Industrial Education, West Allis, Wis., is taking bids through Robert A. Messmer & Brother, architects, 221 Wisconsin Avenue, Milwaukee, for the construction of the second unit, 40 x 100 ft., three stories and basement, of the West Allis Vocational Training School. Samuel Moore is president of the board.

The Universal Motor Co., Oshkosh, Wis., has plans under way for a new factory to cost $60,000.

Indiana

INDIANAPOLIS, May 16.

THE Continental Steel Corporation, Kokomo, Ind., is reported to be planning the construction of a one-story plant, to cost upward of $75,000 with equipment. J. E. Fedrick is general manager.

The American Steel & Wire Co., 208 South La Salle Street, Chicago, has awarded a general contract to Benjamin Wright, 326 West Seventh Street, Anderson, Ind., for a one-story addition to its local plant, 100 x 150 ft., to cost more than $150,000 with equipment. This is the first unit of a general expansion program to be carried out at the plant.

The Adams & Westlake Co., 319 West Ontario Street, Chicago, manufacturer of automobile headlights, locomotive headlights, etc., has awarded a general contract to the Ralph Sollitt & Sons Construction Co., 228 North La Salle Street, for a one- and two-story plant at Elkhart, Ind., 360 x 500 ft., and 140 x 145 ft., respectively, to cost in excess of $500,000 with equipment. Mundie & Jansen, 39 South La Salle Street, Chicago, are architects.

The Board of Education, Madison, Ind., contemplates the installation of manual training equipment in its proposed three-story high school to cost $175,000, for which plans will be drawn by Henkel & Hanson, Heineman Building, Connersville, Ind., architects.

The Motor Oil Co., Logansport, Ind., has filed plans for a one-story storage and distributing plant, 45 x 130 ft., to cost about $40,000 with equipment. Carl J. Horn, Logansport, is architect.

The Chicago, Indianapolis & Louisville Railroad Co. (Monon Route), 608 South Dearborn Street, Chicago, will soon begin superstructure for its locomotive repair shops at Lafayette, Ind., to cost about $300,000 with equipment. A. S. Kent is company engineer, Chicago address.

The Board of Education, Oakland City, Ind., is considering the installation of manual training equipment in a new two-story high school to cost $115,000, for which bids are being asked on a general contract until May 24. H. E. Boyle, Furniture Building, Evansville, Ind., is architect.

Rodney Leonard, Peoples' Life Building, Frankfort, Ind., architect, has filed plans for a six-story automobile service, repair and garage building, 76 x 145 ft., at Indianapolis, to cost $150,000.

The Riess Mfg. Co., Indianapolis, is moving its plant to Kokomo, Ind. The company manufactures a riveting machine used to attach automobile brake linings.

C. B. Coombs, State Avenue and Walker Street, Indianapolis, manufacturer of automobile parts, has leased a factory at Shelby Street and Woodlawn Avenue and will move to the latter location.

The Lucey Slicing Machine Co., 334 East Colfax Avenue, South Bend, Ind., has increased its capitalization from $250,000 to $700,000 to take care of its expanding business.

Detroit

DETROIT, May 16.

CONTRACT has been let by the Peninsular Stove Co., Trumbull and Fort Streets, Detroit, to the Albert A. Albrecht Co., local, for its proposed two-story plant to cost $600,000 with equipment. It will replace a former works of the company recently sold. Albert Kahn, Inc., Marquette Building, is architect and engineer.

The Bay City Lumber & Mfg. Co., Bay City, Mich., recently organized, has acquired the local factory formerly occupied by the McDonald Bean Co. for the production of drop-hammer boards for drop forge plants and kindred products. Edward J. Sloan, previously connected with the

Sloan-Gould Lumber Co., Bay City, heads the new organization.

The General Brass Corporation, Detroit, recently formed to take over and consolidate the McRae & Roberts Co., Michigan Lubricator Co., and the Standard-Peninsula Brass Works, all with local factories, will concentrate production at the plant of the first noted company at Campbell Street and the Wabash Railroad, where additional land is available for future buildings. The present works will be augmented by the installation of additional foundry and other equipment. The company will specialize in the manufacture of radiator valves, plumbing goods, automobile parts, and other brass and metal products. W. S. Killam, heretofore president of the McRae & Roberts Co., will act in like capacity for the consolidated company. Elwood C. Johnston is first vice-president, and William S. Chilman, second vice-president.

The Cadillac Casket Co., 2370 Wabash Avenue, Detroit, has plans under way for extensions and improvements, including a new two-story factory to cost about $50,000. Weston & Ellington, Stroh Building, are architects and engineers. A. D. Tune is president.

The receiver for the Auto Body Co., Lansing, Mich., will offer the plant and equipment of the company at a public sale on June 2. The factory totals 360,000 sq. ft. of floor space.

The Board of Education, Wakefield, Mich., will soon begin the erection of a one-story addition to the high school, to be equipped as an industrial arts building, estimated to cost about $60,000. N. A. Nelson, Sieman Building, Ironwood, Mich., is architect and engineer.

The Century Furniture Co., Grand Rapids, Mich., is having plans drawn for a five-story addition to cost in excess of $100,000 with equipment. H. L. Mead, Michigan Trust Building, is architect.

The Dunn Sulphite Paper Co., Port Huron, Mich., is arranging an expansion program to double approximately the present capacity. Additional equipment will be installed. The company has authorized a bond issue of $350,000, a portion of the fund to be used for the extensions.

The Detroit Creamery Co., Cass and Adams Streets, Detroit, will build a one-story power plant at its new condensary at Midland, Mich. The entire project will cost $200,000. Albert Kahn, Inc., Marquette Building, is architect.

The Grand Haven Brass Foundry, Grand Haven, Mich., has purchased the Cochran Brothers Brass Foundry, Washington, N. J., and also the Bolling Mfg. Co., Grand Haven, Mich. The name of the Cochran foundry has been changed to the Washington Brass Foundry and will be operated as the Eastern division of the Grand Haven company.

The Glasiron Products Co., Michigan and Scotten Avenues, Detroit, has been organized to manufacture a special roofing material made of Armco ingot iron and Pemco porcelain enamel. W. G. Ragsdale is vice-president and secretary of the company.

St. Louis

ST. LOUIS, May 16.

THE Cudahy Packing Co., Omaha, Neb., has plans for a new six-story rendering plant at Kansas City, Kan., reported to cost upward of $125,000 with equipment. The engineering department, Omaha, is in charge.

The Kansas Power Co., Concordia, Kan., has arranged for a bond issue of $3,500,000, a portion of the proceeds to be used for proposed extensions and improvements in power plants and system and for acquisition of other properties in this section. The company is operated by A. E. Fitkin & Co., 165 Broadway, New York. A. E. Fitkin is head of both organizations.

The Stewart Inso Board Co., St. Joseph, Mo., now constructing the first unit of a new plant, 200 x 935 ft., on 50-acre tract at South St. Joseph, plans the early construction of a second unit, one story, totaling about 30,000 sq. ft. of floor space, to cost more than $90,000 with equipment. The company was organized recently with A. D. Stewart, president and general manager; E. S. Sheperd will be general superintendent.

The Black River Hydro-Electric Co., W. A. Fuller, Railway Exchange Building, St. Louis, secretary, is said to be completing plans for a proposed hydroelectric generating plant on the Black River, near Leeper, Mo., with power dam and transmission line. The entire project is expected to cost in excess of $3,500,000. The W. A. Fuller Engineering Co., address noted, is engineer.

The A. B. A. Oil Co., 138 South Fifteenth Street, Lincoln, Neb., has plans for a three-story storage and distributing plant, to cost in excess of $75,000 with equipment. Davis and Wilson, 525 South Thirteenth Street, are architects.

H. W. Guth, 813 Chestnut Street, St. Louis, architect, has completed plans for a one-story automobile service, repair and garage building, to cost about $100,000 with equipment.

The Common Council, Chelsea, Okla., plans the installation of pumping machinery and a 75,000-gal. steel tank on 100-ft. tower, in connection with extensions and improvements in the municipal waterworks and sewage systems. The Benham Engineering Co., Gumbel Building, Kansas City, Mo., is engineer.

The Landreth Machinery Co., 301 East Fourth Street, Joplin, Mo., has plans for a one-story automobile service, repair and garage building, 100 x 135 ft., for company trucks and cars. Smith & Van Pelt, Joplin National Bank Building, are architects.

The Southwestern Light & Power Co., Lawton, Okla., is disposing of a preferred stock issue to total $1,566,000, a portion of the proceeds to be used for extensions and improvements in light and power plants, as well as ice-manufacturing plants. Earl R. Ernsberger is president.

The Board of Education, Topeka, Kan., is said to be planning the installation of manual training equipment in a new senior high school to cost close to $1,000,000, for which plans will be drawn by Thomas W. Williamson & Co., Central National Bank Building, architects.

The Mound Coffin Co., 2000 North Second Street, St. Louis, has awarded a general contract to the Globe Construction Co., Chemical Building, for a new four-story factory branch and distributing plant, to cost $65,000 with equipment. F. J. Kolb, 3855 Shaw Street, is architect.

Gulf States

BIRMINGHAM, May 16.

THE Valley Refrigeration & Canning Corporation, Edinburg, Tex., plans the construction of a one-story cold storage and refrigerating plant, 110 x 200 ft., in connection with a new cannery. The entire project will cost close to $150,000 with machinery. A. Y. Baker is president.

C. M. Ludlow, McAllen, Tex., is at the head of a project to construct and operate a local machine and repair works, to cost close to $50,000 with equipment.

The St. Johns River Terminal Co., Jacksonville, Fla., affiliated with the Southern Railway System, Washington, has begun the construction of a new engine terminal and repair plant, consisting of a one-story engine house; machine and forge shop, 50 x 105 ft.; one-story power house, 40 x 50 ft.; 300-ton steel coaling station and auxiliary structures. The entire project will cost more than $150,000 with equipment. Dwight P. Robinson & Co., Inc., 125 East Forty-sixth Street, New York, is engineer and contractor.

The Gulf Refining Co., Fort Worth, Tex., has plans for a new oil storage and distributing plant to cost $90,000 with equipment.

The Jackson Machinery Co., Millsaps Building, Jackson, Miss., has inquiries out for shovels, draglines and kindred equipment for reclamation work.

The Grayburg Oil Co., San Antonio, Tex., F. L. Thompson, Maverick Building, head, is having plans drawn for a new refinery on neighboring site, to cost more than $250,000 with machinery.

The purchasing division, State Board of Control, Austin, Tex., is asking bids until May 31 for mechanical equipment, including six portable air compressors, nine crushing and screening plants, portable type, each with capacity of 300 tons per day, and 50 asphalt heating kettles, each with capacity of 300 gal.

The San Angelo Refining Co., San Angelo, Tex., will soon begin the construction of a new oil refinery to triple the present output. It will cost in excess of $85,000 with equipment.

The Amarillo Paper Co., Amarillo, Tex., has plans under way for a new two-story and basement factory to cost about $50,000. It is scheduled for completion in August.

In connection with its proposed new plant for the manufacture of steam-driven automobiles, the Associated Steam Motors, Inc., 1026 Comeau Building, West Palm Beach, Fla., is planning the early purchase of equipment including steam and oil separators, oil burners, welding apparatus, tube bending machines, pumping machinery of small high pressure type, valves, etc. E. S. Fortune is one of the heads of the company.

The Lennon Motor Co., Monroe, La., Hugh Lennon, head, is considering the erection of a three-story service, repair and sales building, to cost about $80,000 with equipment.

The city waterworks, J. O. Chappell, superintendent, Union Springs, Ala., is planning the installation of equipment for a new plant, including one electrically-operated centrifugal pumping unit, capacity 500 gal. per min.; one centrifugal pump direct-connected to gasoline engine, capacity 300 gal. per min.; and auxiliary equipment.

The Alabama Power Co., Birmingham, plans extensions and improvements in the plant of the Citizens' Water,

Light & Power Co., Carbon Hill, Ala., recently acquired, including the installation of additional equipment, to cost approximately $25,000.

The Town Council, Many, La., is asking bids until May 31 for equipment for a municipal waterworks, including one motor-driven air compressor; two motor-driven pumping units, each with capacity of 500 gal. per day; and one 50,000-gal. steel water tank and tower. Swanson-McGraw, Inc., Balter Building, New Orleans, is engineer.

The Reed Lumber Co., Selma, Ala., has plans for the immediate construction of two new mills in the vicinity of York, Ala., to cost approximately $100,000 with machinery.

The Eagle Pass Lumber Co., Eagle, Pass, Tex., is planning to purchase an industrial locomotive for limestone quarry operations, either distillate or gasoline-operated.

The Monroe Roofing & Sheet Metal Works, Inc., Monroe, La., has been organized and is dealing in sheet metal and other roofing materials.

Pacific Coast

SAN FRANCISCO, May 11.

THE Specialty Wire Co., South San Francisco, care of Earle D. Hargraves, Miller Avenue, South San Francisco, recently organized by Mr. Hargraves and associates, has awarded a general contract to R. C. Stickle, 304 Linden Street, for a new one-story plant to cost approximately $50,000 with equipment. A 3-acre tract of land has been secured for future expansion. Martin L. Spangler, formerly connected with the Edwards Wire Works, South San Francisco, will be an official of the new company. Mr. Hargraves was previously connected with the American Steel & Wire Co., at its Worcester, Mass., plant.

The Western Machinery Co., Los Angeles, has filed plans for a new one-story foundry for which a general building contract has been let to the Union Iron Works, 5125 Santa Fe Avenue.

The Southern Arizona Power Co., Nogales, Ariz., has plans for a three-story addition to its steam-operated electric power house with installation of additional equipment, to cost in excess of $75,000.

The General Motors Truck Co., Long Beach, Cal., has filed plans for a new one- and two-story service, repair and garage building, 200 x 300 ft., to cost more than $150,000 with equipment.

The Hopper Machine Works, Kern County oilfields, near Bakersfield, Cal., has acquired property in the city limits of Bakersfield and plans the construction of a one-story machine shop and foundry, to specialize in the production of oil-well equipment, to cost upward of $25,000 with machinery.

The Leffingwell Laboratories, Inc., Whittier, Cal., is considering the purchase of a site at Porterville, Cal., for a new plant for the manufacture of spraying devices and materials. It is planned to begin work early in the fall. The cost is reported at more than $25,000. Frank Daybell, vice-president of the Porterville Chamber of Commerce, is general manager.

The Everett Steel Co., Everett, Wash., contemplates the construction of a one-story foundry. Two electric furnaces and other equipment will be installed.

The Hawley Pulp & Paper Co., Oregon City, Ore., is completing plans for the construction of new additions to its plant to increase the capacity from 120 to 200 tons per day. The entire project is reported to cost in excess of $1,000,000 and is scheduled for completion early in 1928. V. D. Simons, 435 North Michigan Avenue, Chicago, is engineer.

The Puget Electric Welding Co., 301 Horton Street, Seattle, has plans under way for a one-story addition, 43 x 70 ft. Herbert A. Blogg, Northern Life Building, is architect.

H. A. Meisel, 650 South Spring Street, Los Angeles, manufacturer of furniture, has plans for the erection of a new one-story factory, 245 x 250 ft., to cost close to $90,000 with machinery.

The Crystal Ice & Fuel Co., Prescott, Ariz., is planning the construction of an addition to its local ice-manufacturing plant.

The Enterprise Foundry Co., 2902 Nineteenth Street, San Francisco, contemplates the erection of a new plant in the Richmond Inner Harbor, Richmond, Cal.

The Smith & Watson Iron Works, Portland, Ore., and the Valley Iron Works, Appleton, Wis., have been merged, effective May 9, the new company to be known as the Smith & Valley Iron Works, with headquarters at Front and Harrison Streets, Portland. The capital stock has been increased from the $100,000 capitalization of the old company to $500,000, and according to officials, there will be approximately $200,000 spent in remodeling the plant within a year and a half, to provide facilities for making equipment for pulp and paper mills. W. G. E. Smith, formerly president of the Smith & Watson company, is president of the new company and S. C. E. Smith and E. A. Peterson are vice-presidents and members of the board of directors.

The Paul Roberts Machine Shop, Pocatello, Idaho, has purchased property formerly owned by the Telluride Power Co. on South Main Street and will remodel the building. A 50-ft. traveling crane will be installed. Within a year it is expected to erect a foundry.

Canada

TORONTO, May 16.

MACHINE tool builders and dealers in this territory report more business in sight than for several months. Inquiries are steadily increasing and several fair-sized lists have recently made their appearance. The erection of new industrial plants and additions has been more pronounced this year and many are preparing to purchase equipment in this connection. The automotive industry and railroad shops have become more active buyers and some good orders have come from these sources. A good demand for tools continues from the mining industry of Canada.

Sales and inquiries are of a diversified character and cover practically all lines of industry. In addition to the business booked by Canadian dealers and builders, large importations of machinery and tools are reported from the United States and Europe.

J. Shearer, Ltd., 225 St. Patrick Street, Montreal, has the general contract for $25,000 addition to the plant of the Torrington Co., Ltd., Bedford, Que., manufacturer of latch needles, etc.

Parry Sound, Ont., ratepayers have carried a by-law authorizing the expenditure of $100,000 on repairs and improvements to the power plant.

Plans are being prepared for the installation of additional machinery in a transformer station at Preston, Ont.

The Donnacona Paper Co., Point Rouge, Que., has started work on the erection of a power plant to cost $50,000.

The Canadian International Paper Co., Paugan Falls, Que., has awarded a general contract to Laflamme & Laflamme, Shawinigan Falls, Que., for the erection of a factory to cost $285,000.

The ratepayers of Sherbrooke, Que., have authorized the expenditure of $50,000 in developing additional power at the Westbury plant.

Lloyd Wright is contemplating building a machine shop at Oakville, Ont., and has applied for a permit.

The Canadian Top & Body Co., Tilbury, Ont., will build an addition to its factory, 80 x 620 ft. E. G. Odette is president.

The Fisher Quebec Gold Mines, Ltd., Montreal, has authorized F. C. Loring and E. M. Loring to purchase equipment for further development at its property.

The Western Steel Products Co., Winnipeg, Man., proposes to reopen the old tube plant at Fort William, Ont. The plant will be used for the making of sheet iron.

The National Hydro Electric Power Co. has submitted plans to the Department of Railways and Canals, Ottawa, for development of about 250,000 hp. at Carillon Falls on the Ottawa River.

The Knechtel Kitchen Cabinets, Ltd., Hanover, Ont., has started work on a one-story, 32 x 54 ft. addition to its factory.

Improvements will be made to the plant of the Bridgetown Electric Co., Bridgetown, Ont. Additions will include a new pipe line, construction of a new power house, installation of a new Pelton waterwheel, etc. E. D. Bean, chief hydraulic engineer of the Associated Gas Co., Oneonta, N. Y., will direct the work.

The Western Clock Co., Peterborough, Ont., has awarded contract for addition to its factory, 80 x 140 ft., of brick and steel. The plating and buffing departments will be housed in the new building.

The Canadian Motor Lamp Co., Ltd., Ford, Ont., has been organized to acquire the assets and business of the Canadian Lamp & Stamping Co., Ltd. It will carry on the policies of the former company and expects to make some plant improvements.

Edward C. Dingman, Montreal dealer for the Climax Engineering Co., Clinton, Iowa, has removed his office from the Keefer Building to the Castle Building, 1410 Stanley Street.

The Ferro Enameling Co. of Canada, Ltd., Ottawa, Ont., has been organized as a branch of the Ferro Enameling Co., Cleveland. H. D. Cushman is president and R. A. Weaver,

vice-president. Wilfred Mavor has resigned as Eastern representative of the Ferro Enamel Supply Co., Cleveland, to become manager of the Canadian company.

Western Canada

The Manitoba Power Co., Winnipeg, will spend $250,000 on extensions and improvements and $300,000 on equipment to a power development plant at Great Falls, Man.

The Canadian Pacific Railway Co., Winnipeg, will spend $200,000 on additions and equipment for its local shops.

The Winnipeg Hydro Electric Commission, Winnipeg, proposes to expend $700,000 this year on the erection of substations and equipment.

The Winnipeg Electric Co., Winnipeg, has prepared a building program which will involve an expenditure of $750,000. It will include an addition to the power plant at Great Falls and the installation of equipment.

Preliminary work has started on the erection of a $200,000 sawmill at New Westminster, B. C., for the international Wood Products Co. Homer E. Leash is managing director.

The X. L. Sand, Gravel & Brick Co., New Westminster, B. C., will call for bids soon for the erection of a brick plant at Annieville, B. C., to cost $100,000.

The Riverside Iron Works Co., Ltd., Calgary, Alta., has awarded contract to the Bennett & White Construction Co., Ninth Avenue West, for the erection of a machine and molding shop to cost $64,500.

T. H. Waters & Co., Nelson, B. C., have been awarded the general contract for the first unit of a $75,000 factory for the British Columbia Veneer Works, Ltd., the building to be completed within 60 days.

The Port Haney Brick & Tile Co., Port Haney, B. C., has purchased a 10-acre site adjoining its property for the erection of an addition to its plant.

Foreign

THE Government of Chile, Santiago, is asking bids until Oct. 1 for the construction of port works at Iquique, to include cranes, material-handling equipment, etc. The entire project is estimated to cost $6,328,000. Information at the office of the Bureau of Foreign and Domestic Commerce, Washington, reference Chile No. 243356. The American Consulate, Iquique, Harry Campbell, consul, also has data.

The Compania Radioargentina, Madrid, Spain, an Argentine organization, has secured a concession from the Spanish Government for the construction and operation of a radio broadcasting station for communication with American countries, with high power station. The agreement provides for the construction of the plant in Spain within three to nine months. The American Consulate, Madrid, Charles H. Cunningham, commercial attaché, has information regarding the project.

The Porcelain and Glass Trust of the Ukraine, Kiev, Russia, F. A. Rataichak, president, has plans for the construction of a local glass manufacturing plant to cost close to $3,000,000. The equipment is estimated to cost $1,200,000 and will be obtained in the United States, purchases to be made by the Amtorg Trading Corporation, 165 Broadway, New York, official purchasing agency for the Soviet Russian Government.

The Compania Zeppelin, affiliated with the La Colon Transaerea, Seville, Spain, recently formed with a capital of 1,000,000 pesetas (about $170,000) to operate an air service between Seville and Buenos Aires, Argentina, plans the construction of a traffic service and instruction base at Seville, with hangars, shops, etc. The American Consulate, Madrid, Spain, Charles H. Cunningham, commercial attaché, has information regarding the project.

A company at La Guaira, Venezuela, has been authorized to proceed with the construction of a new local dock, in accordance with plans now being approved by the Venezuelan Government. The structure will be about 1300 ft. long, and will include three warehouses, each more than 300 ft. long, with traveling cranes and other conveying and material-handling machinery. Information at the office of the Bureau of Foreign and Domestic Commerce, Washington, also at the American Consulate, La Guaira, Daniel J. Driscoll, vice-consul.

Industrial Finances

Net income of the American Steel Foundries, Chicago, for the quarter ended March 31, 1927, totaled $1,285,448 after all charges, equivalent after preferred dividends, to $1.25 a share on the no par common stock outstanding. This compared with $1,339,041 net, or $1.31 a common share in the corresponding period of last year.

Directors of the Allis-Chalmers Mfg. Co., Milwaukee, have voted to redeem the $16,500,000 of 7 per cent preferred stock on July 1, at $110, and accrued interest. The company plans to issue $15,000,000 in 10-year, 5 per cent debentures.

The Replogle Steel Co., Wharton, N. J., and subsidiaries, earned a net profit of $79,474 during the quarter ended March 31, 1527, compared with $100,481 in the corresponding quarter of 1926. Sales in the first quarter of 1927 amounted to $984,294 as against $1,189,735 in the same period of 1926.

E. L. Herndon, receiver of the Eastern Steel Co., Pottsville, Pa., reports manufacturing profit before allowance for depreciation during the period from Jan. 9 to Dec. 31, 1926 of $199,814. After deducting selling, administrative and general expenses and other items the company had a net profit of $91,313 before depreciation, interest and appraisers' fees.

The Morgan Engineering Co., Alliance, Ohio, listed on its balance sheet of Feb. 28, 1927, total current assets of $1,335,244 and total current liabilities of $439,456.

The Cleveland Cliffs Iron Co., Cleveland, reports an operating profit of $2,082,655 during 1926, compared with $1,528,318 in 1925. Total profit was $3,199,614 and net income after allowing all charges, including $1,214,402 for depreciation and depletion, was $1,729,067. The loss of the Barnes-Hecker mine, which was abandoned after it caved in, and the dismantling of the Gladstone furnace plant resulted in a reduction of $1,134,050 in the property account. The profit and loss surplus was decreased by $1,500,000, which was appropriated to cover the loss of the mine disaster and the reparation to families of miners who lost their lives. President William G. Mather in his annual report said that, while the increase in dividend left little to be added to surplus, business prospects indicate that the present rate can be maintained this year.

The Elyria Iron & Steel Co., Cleveland, reports gross sales for the first quarter of $1,210,000 and net profit before taxes and preferred dividends of $163,724. The balance of $135,157 after preferred dividends and tax reserves is about the same as for the first quarter last year.

The Wheeling Steel Corporation earned 83c. per share on its common stock in the first quarter of this year compared with $1.05 in the same period last year. After payment of preferred dividends there remained a balance of $992,251, against $1,079,614 in 1926.

The Superior Steel Corporation, Pittsburgh, lost $38,015 in the first quarter of this year, which compares with a net profit of $151,987 in the same period of 1926. There was a profit from operations this year of $33,118, but against total income of $58,724 there were charges for depreciation, interest, taxes, etc., amounting to $96,739.

The Stanley Works, New Britain, Conn., in its balance sheet of Dec. 31, 1926, as filed with the Massachusetts secretary of State, showed total assets and liabilities of $20,179,904, compared with $18,722,772 at the end of 1925. Surplus at Dec. 31, 1926, amounted to $3,952,448, as against $3,475,252 one year before.

Quarterly report of the Republic Iron & Steel Co. for the period ended March 31 shows a net gain from operations amounting to $1,879,061, after deducting $1,118,741 for maintenance and repair and providing for Federal taxes. Further deduction for depreciation and for exhaustion of minerals, to the extent of $581,240, leaves $1,297,821 net profit. After taking out $253,389 interest on bonds and notes and $737,500 dividends, the surplus for the quarter stands at $306,932. Unfilled orders on March 31 are reported at 165,391 tons, a gain over the Dec. 31 total of 157,250 tons.

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